PB81-244626

Wastewater Management for Boise, Eagle, and Ada County, Idaho

(U.S.) Environmental Protection Agency
Seattle, WA

Aug 81

U.S. Department of Commerce
National Technical Information Service

EPA 910/9-81-084-f

United States
Environmental Protection
Agency

Region 10
1200 6th Avenue
Seattle, WA 98101

PB81-244626

August 1981

EPA-10-ID-Boise/Eagle-Ada-WWTW-81

EPA

Environmental Impact Statement

Final

Wastewater Management for Boise, Eagle, and Ada County, Idaho

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1. REPORT NO. 910/9-81-084-F	2.	3. RECIPIENT'S ACCESSION NO. PB81 244626
4. TITLE AND SUBTITLE WASTEWATER MANAGEMENT FOR BOISE, EAGLE, AND ADA COUNTY, IDAHO. FINAL ENVIRONMENTAL IMPACT STATEMENT.		5. REPORT DATE August 1981
		6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S)		8. PERFORMING ORGANIZATION REPORT NO.
9. PERFORMING ORGANIZATION NAME AND ADDRESS Jones & Stokes Associates, Inc. 2321 P Street Sacramento, CA 95816		10. PROGRAM ELEMENT NO.
		11. CONTRACT/GRANT NO.
12. SPONSORING AGENCY NAME AND ADDRESS U.S. Environmental Protection Agency Region X M/S 443 1200 6th Avenue Seattle, WA 98191		13. TYPE OF REPORT AND PERIOD COVERED Final EIS
		14. SPONSORING AGENCY CODE
15. SUPPLEMENTARY NOTES		

16. ABSTRACT

PROPOSED CONSTRUCTION OF WASTEWATER FACILITIES BY THE CITY OF BOISE AND THE EAGLE SEWER DISTRICT ARE APPROVED BY THE ENVIRONMENTAL PROTECTION AGENCY, AND GRANT ASSISTANCE IS RECOMMENDED. THE EPA HAS CONCLUDED THAT THA PROJECTS ARE COST EFFECTIVE AND ENVIRONMENTALLY PREFERABLE TO OTHER OFFERED ALTERNATIVES. CONCERN REMAINS OVER LOW FLOW REQUIREMENTS IN THE BOISE RIVER AND POTENTIAL HABITAT IMAPCTS ASSOCIATED WITH THE NEW EAGLE SEWER DISTRICT TREATMENT FACILITY. EPA REQUESTS THE EAGLE SEWER DISTRICT TO CONSULT WITH THE IDAHO DEPARTMENT OF FISH AND GAME AND WITH THE U.S. FISH AND WILDLIFE SERVICE DURING THE PRE DESIGN PHASE.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
SEWAGE TREATMENT COMMUNITY DEVELOPMENT ENVIRONMENTAL IMPACT STATEMENT IDAHO	ADA COUNTY, IDAHO BOISE, IDAHO	

18. DISTRIBUTION STATEMENT	19. SECURITY CLASS *(This Report)*	21. NO. OF PAGES
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August 14, 1981

REPLY TO ATTN OF: M/S 443

TO: All Interested Agencies, Public Groups and Citizens

Enclosed for your review and comment is the Final Environmental Impact Statement (EIS) for wastewater management for Boise, Eagle and Ada County, Idaho.

This EIS was prepared in compliance with the National Environmental Policy Act and implementing Agency regulations (40 CFR Part 6, November 6, 1979). Availability of the EIS will be announced in the Federal Register on August 14, 1981, beginning a 30-day comment period which will close on September 14, 1981. This agency will take no administrative action on this project until the close of the comment period.

We will appreciate your review of this document and any comment you may have. Please send all comments to Norma Young, M/S 443 at the above address.

Final
Environmental Impact Statement

Wastewater Management for Boise, Eagle and Ada County, Idaho

Boise Project No. C-16-0305

Eagle Project No. C-16-0288

Prepared by:

U. S. Environmental Protection Agency
Region 10
Seattle, Washington 98101

With technical assistance from:

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Deputy Regional Administrator
Date: July 6, 1981

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EXECUTIVE SUMMARY

( ) Draft Environmental Impact Statement

(X) Final Environmental Impact Statement

Type of Action: Administrative

Background

On March 27, 1981 the U.S. Environmental Protection Agency (EPA) released for public review and comment a Draft Environmental Impact Statement (EIS) which evaluated the environmental impacts associated with proposed wastewater treatment facilities for the City of Boise, Idaho and the Eagle Sewer District (ESD). The decision to prepare an EIS on the proposed facilities was based on grant applications from the City and the ESD for construction grant assistance to plan, design and construct the needed facilities. The Draft EIS was prepared concurrently with the City of Boise and the ESD's detailed facilities plans. In addition, the Ada Planning Association (APA) requested Section 208 grant funds to evaluate wastewater management alternatives in the rural portions of Ada County. Attention was focused on the area southwest of Boise.

As a result of the three separate grant applications and the extensive environmental analysis that would need to be performed for each of the many alternatives, EPA decided to evaluate the environmental impacts from an areawide or cumulative perspective in a single EIS. EPA's Draft EIS, therefore, includes detailed analysis of each of the alternatives presented in the Boise and Eagle facilities plans as well as a number of wastewater management alternatives for the rural areas of southwest Boise. A public hearing on the Draft EIS was held in the City of Boise on April 30, 1981.

EPA's Recommended Action

EPA concurs with the City and the ESD's proposed construction of wastewater facilities and recommends that grant assistance be awarded for those portions of the facilities determined to be grant eligible by the Idaho Department of Health and Welfare (IDHW) and EPA. EPA has also concluded that the proposed projects are cost effective and environmentally preferable to the many alternatives evaluated. There are, however, two issues which remain to be resolved. They concern low flow requirements in the Boise River and potential habitat impacts associated with the new ESD treatment facility site. EPA recommends that the City of Boise continue to work with the Corps of Engineers to insure a 1 in 10 year minimum resource maintenance flow of 80 cfs (Lucky Peak outlet) in the Boise River. We intend to request the grantee to submit a summary and schedule of actions to be taken along with an annual progress report to meet this end. EPA will also request the ESD to consult with the Idaho Department of Fish and Game and the U.S. Fish and Wildlife Service during the pre-design phase to ensure that mitigation measures deemed necessary by these agencies are incorporated into the design. Certain types of development within the proposed site may be limited according to this consultation.

Proposed Projects

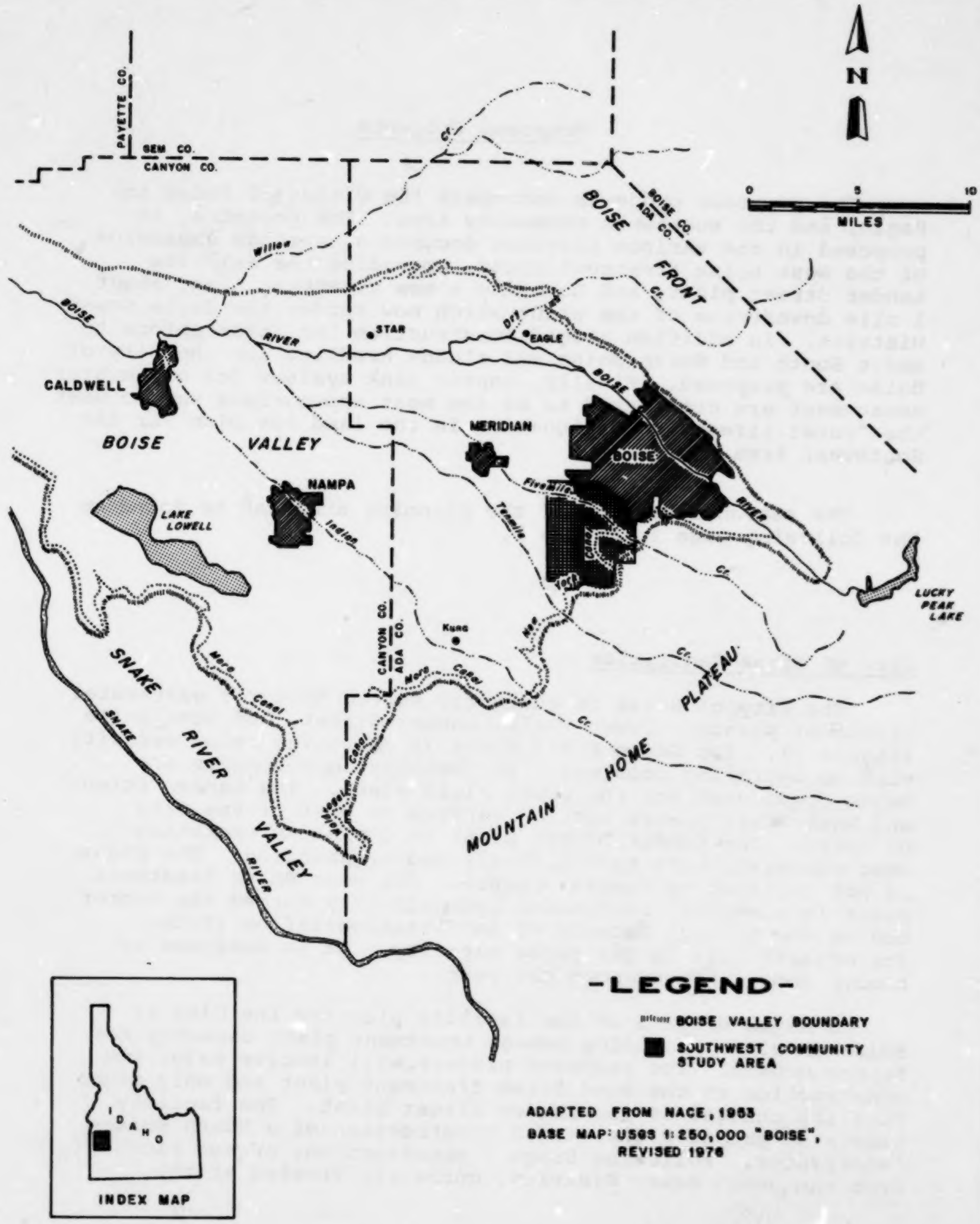
The proposed projects encompass the Cities of Boise and Eagle, and the southwest community area. The projects, as proposed in the various planning documents, include expansion of the West Boise treatment plant, upgrading the existing Lander Street plant, and building a new treatment plant about 1 mile downstream of the plant which now serves the Eagle Sewer District. In addition staged construction for interceptors to serve South and North Boise and sludge handling for the City of Boise are proposed. Finally, septic tank systems for wastewater management are considered to be the most appropriate way to meet the "rural lifestyle" designation in the land use plan for the Southwest Area.

The regional setting of the planning area can be found on the following page in Figure 1.

City of Boise Facilities

The City of Boise is currently served by three wastewater treatment plants: Gowen Field, Lander Street, and West Boise (Figure 2). The Gowen Field plant is operating below capacity with no operating problems. No facility improvements are being considered for the Gowen Field plant. The Lander Street and West Boise plants provide service to most of the City of Boise. The Lander Street plant is currently operating near capacity, both hydraulically and organically. The plant is not designed to remove ammonia. The West Boise treatment plant is currently overloaded hydraulically during the summer months due to high amounts of infiltration/inflow (I/I). Its organic load is far below capacity. It is designed to remove ammonia throughout the year.

A major element of the facility plan for the City of Boise involves providing sewage treatment plant capacity for future growth. The proposed project will involve major new construction at the West Boise treatment plant and only minor facility changes at the Lander Street plant. The facility plan also proposes the staged construction of a South Boise interceptor. Following Stage 1 construction, sewage flows from the Bench Sewer District, currently treated at the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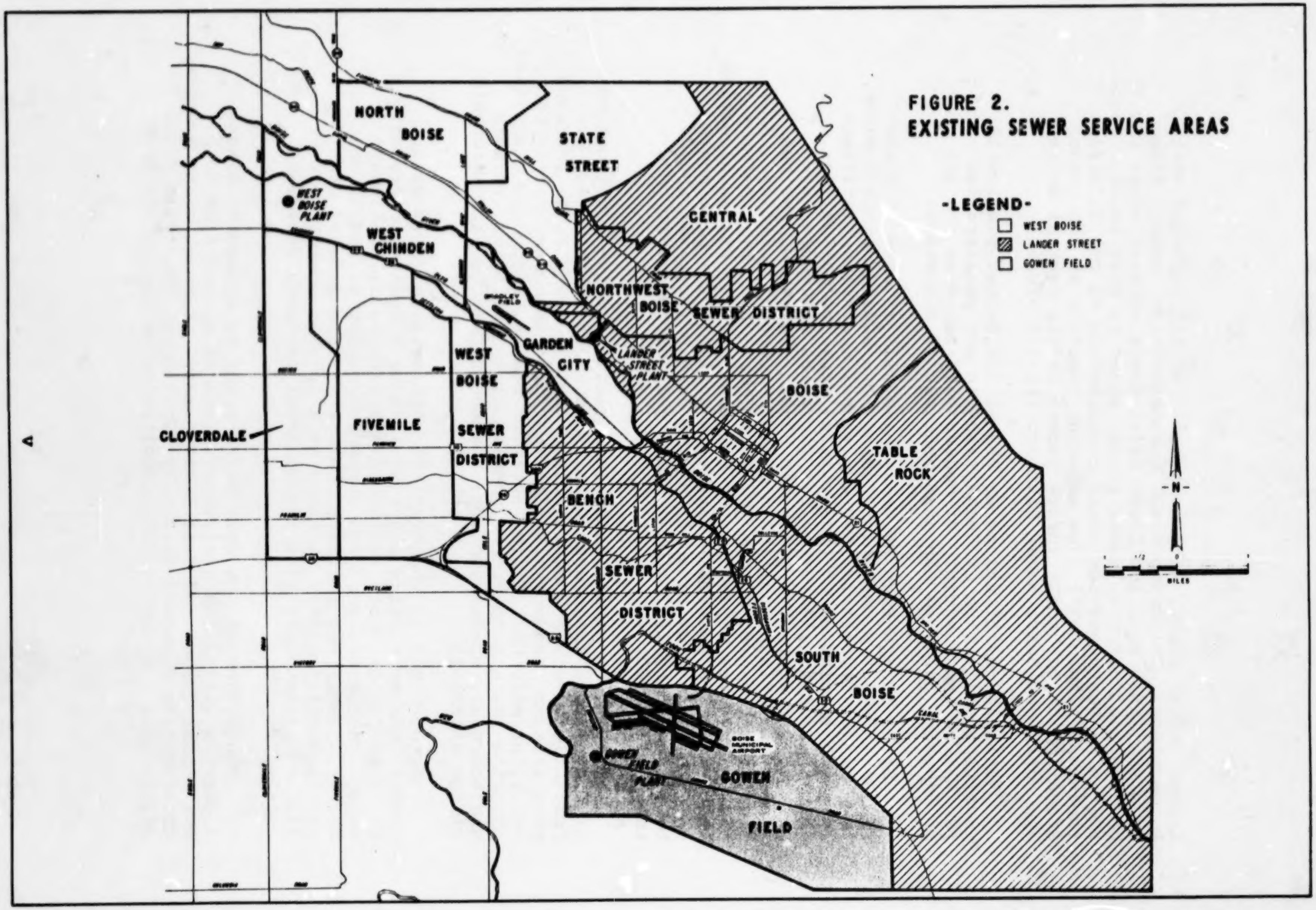
SNAKE RIVER VALLEY
SNAKE RIVER
MOUNTAIN HOME PLATEAU
I D A H O
INDEX MAP
-LEGEND-
BOISE VALLEY BOUNDARY
SOUTHWEST COMMUNITY STUDY AREA

ADAPTED FROM NACE, 1953
BASE MAP: USGS 1:250,000 "BOISE", REVISED 1976

FIGURE 1. REGIONAL SETTING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GARDEN CITY
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WEST BOISE SEWER DISTRICT
BOISE
TABLE ROCK
CLOVERDALE
FIVEMILE
BENCH SEWER DISTRICT
SOUTH BOISE
BOISE MUNICIPAL AIRPORT
GOWEN FIELD PLANT
GOWEN FIELD

FIGURE 2.
EXISTING SEWER SERVICE AREAS

Lander Street plant, will be treated at the expanded West Boise plant. Following Stage 2 construction, sewage flows from the Table Rock and South Boise sewer service areas would be diverted from the Lander Street plant to West Boise. These shifts in sewer service areas contributing to the different treatment plants will free existing capacity at the Lander Street plant to handle future growth in the Central Boise and Northwest Boise Sewer District service areas.

Stage 1 modifications at the Lander Street plant will involve installation of dechlorination and postaeration facilities and a variety of measures to increase the use of digester gas from the anaerobic sludge digesters.

Stage 1 expansion at West Boise will involve an additional influent pump, grit chambers, an additional comminutor, two primary clarifiers, two additional secondary clarifiers, additional aeration at the existing aeration basins, dechlorination facilities, a new flotation thickener, new primary and secondary anaerobic sludge digesters, various sludge and grit pumps, and a digester control building. A significant aspect of the proposed West Boise plant modification involves replacing the existing aerobic sludge digestion system with an anaerobic digestion system. The peak month average daily flow capacity of the West Boise plant would be increased by 10.7 MGD (million gallons per day), to a total of 17 MGD.

Stage 2 expansion would essentially involve construction of a duplicate treatment facility adjacent to the Stage 1 facilities. Stage 2 construction would involve a new influent pump station, headworks facilities (grit chambers, comminutors, etc.), primary clarifiers, aeration basins, secondary clarifiers, chlorine contact chambers, postaeration facilities, primary and secondary sludge pumping, sludge thickeners, and anaerobic sludge digesters.

As outlined in the draft facilities plan (CH2M Hill 1980c), the West Boise plant would have a hydraulic capacity of 34 MGD (peak month average daily flow basis) following Stage 2 construction. The Idaho Department of Health and Welfare (IDHW) has indicated that state and federal grant funding will probably be based on a 20-year sewage flow of 23.5 MGD (Korpalski 1981); additional capacity would be locally funded.

Conversion at the West Boise plant to anaerobic sludge digestion will allow agricultural use of sludge from both the Lander Street and West Boise plants. Current plans involve transporting digested sludge by pipeline to the Idaho State Prison area for use as soil conditioner on the prison farm.

Two interceptor system expansions were evaluated as part of the facility planning process. The South Boise interceptor would shift sewage flows from the Lander Street plant to the West Boise plant, as discussed previously. Stage 1 construction would allow the Bench Sewer District to be served by the West Boise plant. Stage 2 expansion would connect the South Boise and Table Rock sewer service areas.

The North Boise interceptor would provide sewer service to currently unsewered portions of the North Boise sewer service area. The interceptor would be sized to accommodate 11,000 connections from a 2,400-acre area. The North Boise interceptor would also provide up to 5.6 MGD of additional capacity for sewage flows from the State Street service area. It is at present uncertain whether the North Boise interceptor will receive state and federal funding for Stage 1 construction.

In addition to the interceptor projects identified above, Stage 1 construction would include rehabilitation of existing interceptors in the Garden City area. The Garden City interceptor system is subject to considerable infiltration of groundwater during the summer, apparently from the Thurman Mill Ditch. The proposed rehabilitation program is expected to eliminate 30 percent (1.04 MGD) of the present summer infiltration.

EPA has awarded a limited Step 2 grant to allow early design work for certain elements of the West Boise plant modifications. The facility elements involved (a comminutor, one return activated sludge pump, and one secondary clarifier) are needed to alleviate existing hydraulic overloads at the plant.

Eagle Sewer District Facilities

The ESD is proposing to abandon the existing facility site. A new facility would be constructed on a 65-acre site adjacent to the north channel of the Boise River, about 1 mile west (downstream) of the present site (Figure 3). The preferred project involves construction of a gravity flow interceptor from the existing site to the new site, pretreatment and lift station facilities, two aerated lagoons, an equalization lagoon, and an effluent pump station.

Effluent disposal is expected to involve a 35-acre rapid infiltration site about 0.4 mile east of Palmer Road and 0.3 mile south of Beacon Road. An underdrain system will collect the percolate and discharge it to an adjacent drainage ditch which eventually discharges to the Boise River. Effluent would be transported from the treatment plant site to the infiltration area by a 4-mile-long force main.

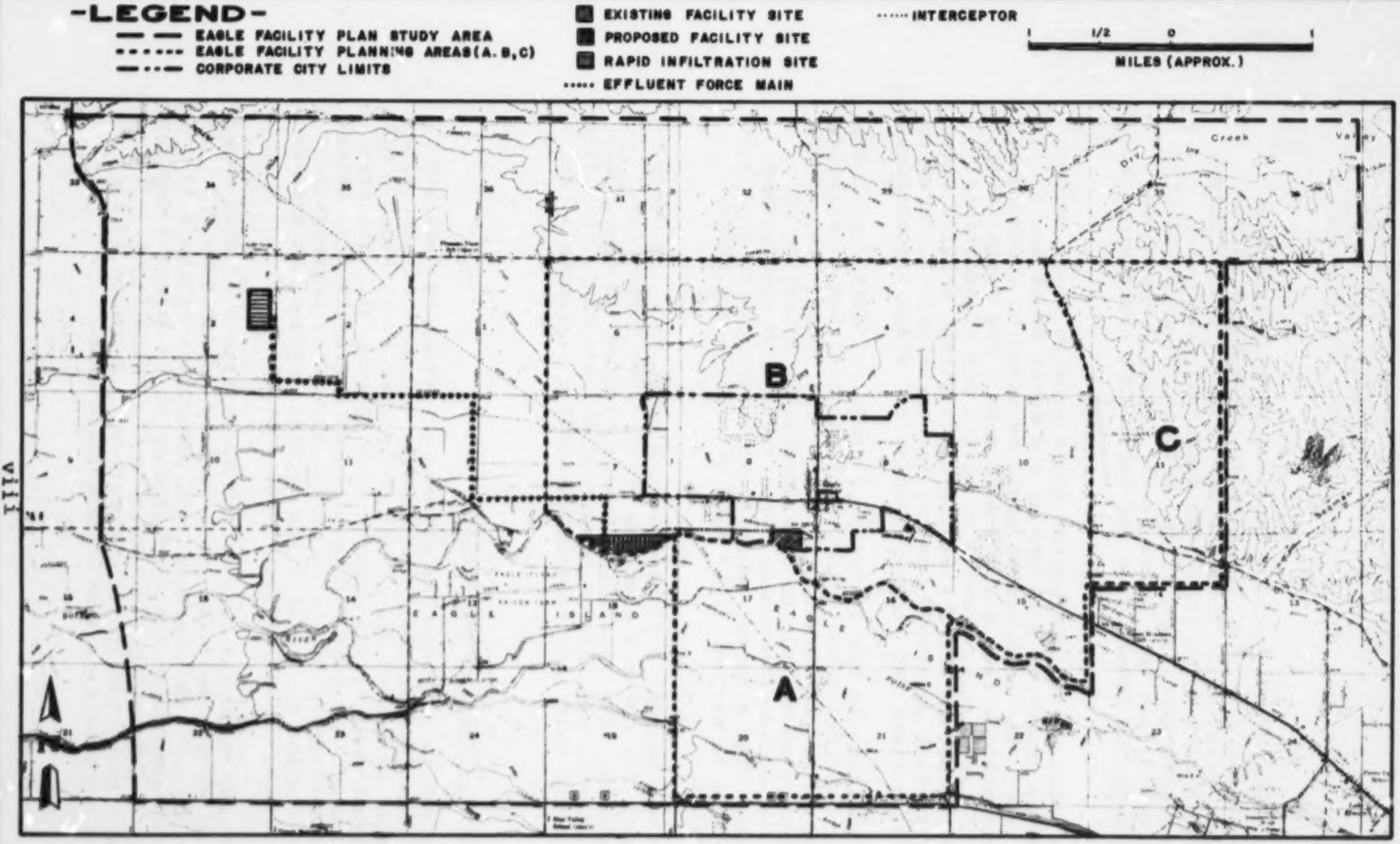

-LEGEND-
EAGLE FACILITY PLAN STUDY AREA
EAGLE FACILITY PLANNING AREAS (A, B, C)
CORPORATE CITY LIMITS
EXISTING FACILITY SITE
PROPOSED FACILITY SITE
RAPID INFILTRATION SITE
EFFLUENT FORCE MAIN
INTERCEPTOR
1/2
0
1
MILES (APPROX.)
A
B
C
EAGLE ISLAND
EAGLE ISLAND
Dry Creek Valley

FIGURE 3. FACILITY PLANNING AREAS FOR THE EAGLE SEWER DISTRICT

The overall ESD project would be staged, with the second aeration lagoon and three of the seven infiltration basins to be constructed in 1990. Initial project construction would provide 0.75 MGD of capacity (peak month average daily flow basis); this would be adequate to serve about 8,000 residents in the service area. Second-stage construction would bring treatment capacity to 1.31 MGD, sufficient for about 13,300 residents.

If the preferred rapid infiltration project proves to be infeasible, an oxidation ditch system would be constructed at the new treatment plant site. This treatment system would involve pretreatment and lift station facilities, an oxidation ditch with brush aerators, two secondary clarifiers, chlorination facilities, and a sludge basin. Treated effluent would be discharged to the north channel of the Boise River. Sludge from the clarifiers would be used as soil conditioner.

Southwest Area Wastewater Management

The Southwest community wastewater management study was performed in conjunction with revisions to the Ada County comprehensive plan. Adoption of a "rural lifestyle" land use plan for the Southwest area dictates continued reliance on septic tank systems for wastewater management. The adopted Southwest area wastewater management plan (APA 1981) involves a countywide voluntary septic tank maintenance program, a public information and education program, and recommendations for various other measures.

Summary of Impacts and Mitigation Measures

Surface Water Quality

The proposed facility improvements at the West Boise and Lander Street plants will result in generally improved effluent quality. Nutrient loadings to the Boise River and downstream reservoirs will, however, increase as wastewater flow volumes increase. Avoidance of potential problems with ammonia levels in the treatment plant effluent depends on maintenance of minimal water flows in the Boise River. **EPA will request the City to continue to pursue a guaranteed 1-in-10 year minimum flow release of 80 cubic feet per second from Lucky Peak Reservoir.**

Return flows from the ESD rapid infiltration site are not expected to have any adverse impacts on the Boise River.

Groundwater Quality

Percolation of septic tank effluent into local groundwater systems will be reduced as currently unsewered areas become connected to the Boise treatment system. The decision not to provide central sewer systems in the Southwest area will continue current septic tank use patterns and associated waste loadings to local groundwater systems.

The proposed sludge disposal operation at the Idaho State Prison area will require monitoring of groundwater conditions to ensure that groundwater pollution problems will not develop. The rapid infiltration site for the ESD facilities needs more detailed soils and groundwater evaluations to verify the feasibility of the proposed project.

Air Quality

A major problem in the Boise/Ada County area is a high level of carbon monoxide (CO) in the atmosphere. Available monitoring data indicates that the high CO levels occur primarily along major traffic corridors. With the additional growth that is projected for the area, impacts to the ambient air quality will likely worsen unless effective mitigative measures can be implemented. In accordance with the Clean Air Act of 1970 and the 1977 Clean Air Act amendments, EPA has designated Ada County as a "nonattainment area" for CO. Efforts have been made by the County to develop a State Implementation Plan for achieving the federal primary standards as quickly as possible.

Vegetation and Wildlife

Riparian habitat along the Boise River will be disturbed or destroyed by construction of the new ESD facilities and by various City of Boise interceptors and sludge pipelines. The ESD facility site involves removal of 15 acres of riparian habitat from one of the larger riparian areas remaining along the Boise River. EPA will request both the Eagel Sewer District and the City of Boise to consult with the Idaho Department of Fish and Game and the U.S. Fish and Wildlife Service during predesign of the proposed projects and location of interceptors to mitigate these impacts to the maximum extent possible.

Growth-Related Impacts

Population growth will be accommodated by increased treatment capacity at the City of Boise and ESD facilities. Continued development will involve several areawide types of impacts. Major areawide concerns include traffic and air quality impacts, urbanization of prime farmlands, and problems with timely provision of urban services. Local agencies are currently attempting to deal with these issues through a variety of ongoing planning programs.

No-Action Alternative

Federal regulation (40 CFR, Part 6) requires that all EISs consider the impacts of continued use of the wastewater treatment and disposal methods currently serving area residents. This is the no-action alternative.

For Boise this would mean that the existing Lander Street and West Boise plants would continue to operate as is, with the potential for ammonia toxicity, residual chlorine toxicity and reduced oxygen levels during low river flows. There is no capacity to handle additional population growth in the area. Most of the Boise area residents using septic tanks would continue to do so with potential surface and groundwater contamination. The city would have to finance any extensions of central wastewater service to new residential, commercial or industrial development.

For the Eagle Sewer District the no-action alternative would mean continuing violation of the District's NPDES discharge permit and would not provide for any improvement in the quality of effluent being discharged into the Boise River. New development would have to rely on the use of septic tanks.

These alternatives were determined to be unacceptable for Boise and the ESD and therefore were dropped from further consideration.

Chapter 1

INTRODUCTION

The EIS Process

National Environmental Policy Act of 1969 (NEPA) requires that all agencies of the federal government must evaluate the environmental consequences of actions they undertake or sponsor. Consistent with other essential considerations of national policy, agencies are directed to avoid or minimize possible adverse effects of their actions on the quality of the human environment. The major implementation tool of NEPA is the Environmental Impact Statement (EIS). An EIS serves as a decision-making document which describes and analyzes alternative actions or projects. The EIS process serves as a means of obtaining input into agency decisions from other federal agencies, state and local agencies, and the general public.

The EIS process also provides a means for ensuring that project planning considers the requirements of applicable laws and policies. Examples of broadly applicable federal legislation include the Clean Water Act, the Clean Air Act, the Safe Drinking Water Act, the Endangered Species Act, the Fish and Wildlife Coordination Act, and the National Historic Preservation Act. Various Executive Orders and agency policies also must be considered in connection with the protection of floodplains, wetlands, and prime farmland.

Grant Programs Under the Clean Water Act

The federal Clean Water Act establishes a basic goal of achieving "fishable, swimmable" surface waters throughout the country by 1983, and the elimination of pollutant discharges by 1985. The act establishes a permit system (National Pollutant Discharge Elimination System [NPDES]) to regulate the discharge of pollutants to waters of the United States. The various provisions of the Clean Water Act are administered by the U. S. Environmental Protection Agency (EPA).

Section 201 of the Clean Water Act provides a program to help meet the costs of upgrading publicly-owned wastewater treatment systems. These "clean water grants" administered by EPA provide up to 75 percent (or up to 85 percent for innovative treatment/disposal systems) of the planning and construction costs for eligible facility improvements. In order to receive this funding assistance, local wastewater management projects must be planned and designed in accordance with various EPA requirements.

Section 208 of the Clean Water Act provides a separate grant program to fund studies of "areawide" water quality problems.

Background to Development of This EIS

A number of public wastewater treatment systems in Ada County have received EPA grant funds in recent years, including facilities for the City of Meridian and the City of Kuna. Recently, the City of Boise and the Eagle Sewer and Water District also initiated facility planning programs under the Section 201 grant program. In addition, the Ada Planning Association requested Section 208 grant funds to evaluate wastewater management alternatives in the rural portions of Ada County. Particular attention was focused on the area southwest of Boise.

EPA decided that a single EIS should be prepared to evaluate proposed wastewater management projects in the Boise area. While the individual projects can be analyzed separately, the significance of project-specific impacts is best determined from an areawide or cumulative perspective. The individual projects under consideration include those of the City of Boise, the Eagle Sewer District, and the Ada Planning Association's Southwest Area study.

A Draft EIS evaluating these projects was issued on March 16, 1981. A public hearing on the Draft EIS was held in Boise, Idaho on April 30, 1981. The Draft EIS has been revised in response to oral and written comments received prior to, during or subsequent to that public hearing. Written comments on the Draft EIS are presented in Chapter 15 of this Final EIS.

Section 201 grants under the Clean Water Act are issued in three stages. Step 1 grants cover initial feasibility and planning studies, resulting in the preparation of draft facility plans. Stage 2 grants cover detailed facility design work. Step 3 grants cover actual project construction. Step 2 grants normally are not awarded until the completion of all environmental reviews. Because of current facility overloading and associated water quality problems, an accelerated Step 2 grant has been given to the City of Boise. This Step 2 grant allows design work to proceed for three items in the overall facility plan: a comminutor, a return activated sludge pump, and one secondary clarifier.

Report Format

This EIS is organized into chapters which discuss general topic areas investigated during report preparation. The initial chapters provide information on the wastewater management programs planned for the area. Subsequent chapters discuss major topic areas related to potential impacts. Each such chapter includes discussion of essential background information, relevant project details, impact analyses, and potential mitigation measures. Some of the chapters in this EIS are based on special studies described in more detail by separate study reports or appendix documents. Appendix documents released with the Draft EIS have not been reprinted for this Final EIS. All appendix references in this report are to the appendices printed and distributed with the Draft EIS.

Several reports have been prepared specifically for this project, and represent a considerable amount of supplemental technical information which may be useful to those reviewing this Draft EIS. These reports include:

- Ground Water Resources of Boise Valley, Idaho, H. Esmaili & Associates, Inc. June 1980.
- Nonpoint Source Waste Loadings in Ada County and Southwest Community Study Area, H. Esmaili & Associates, December 1980.
- Drainage Task Report - Drainage Planning and Institutional Evaluations, Jones & Stokes Associates, Inc. February 1980.
- A Tethersonde Field Study Examining Low Level Stability in the Boise Valley, North American Weather Consultants. April 1980.

- Ozone Data for Ozone Special Study, Boise, Idaho, Earth Metrics, Incorporated. November 1979.

These reports are available for review in the EPA Boise office. If a strong need is identified by a reviewer, a copy of the required report will be provided. The appendix to the Draft EIS is also available in the EPA Boise office.

Chapter 2

WATER QUALITY MANAGEMENT IN ADA COUNTY

Locational Setting

Ada County, Idaho is located north of the Snake River in the southwestern part of the state (Figure 2-1). Encompassing 673,000 acres, most of the county is between 2,500 and 3,300 feet elevation. The northeastern portion of the county includes the slopes of the Boise Front, which rises to elevations of about 5,900 feet. The southern part of the county is primarily desert, with urban and agricultural areas concentrated in the northern half of the county. The northern half of the county is drained by the Boise River, which joins the Snake River along the border between Idaho and Oregon.

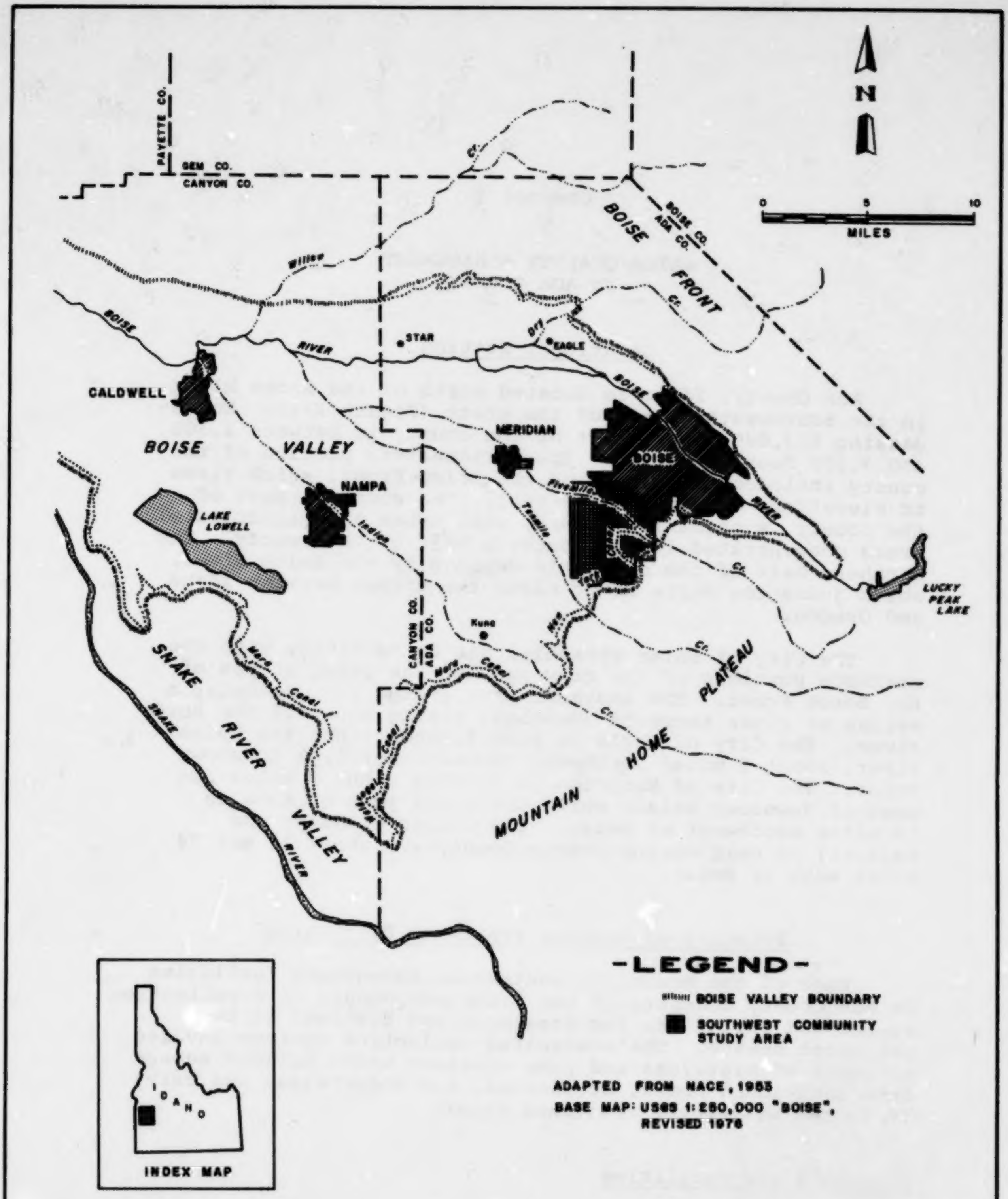
The City of Boise straddles the Boise River, with the northern portions of the city against the lower slopes of the Boise Front. The southern part of the city occupies a series of river terraces (benches) rising south of the Boise River. The City of Eagle is also located along the Boise River, about 9 miles northwest (downstream) from downtown Boise. The City of Meridian is located about 9 miles due west of downtown Boise, while the small Town of Kuna is 13 miles southwest of Boise. The Cities of Nampa and Caldwell in neighboring Canyon County are about 18 and 24 miles west of Boise.

Existing Wastewater Treatment Facilities

Each of the municipal wastewater management facilities in Ada County consists of two basic components -- a collection system and facilities for treatment and disposal of the collected sewage. The wastewater collection systems involve networks of pipelines and pump stations which collect sewage from individual homes, businesses, and industries, and carry it to the wastewater treatment plant.

City of Boise Facilities

The City of Boise is served by three wastewater treatment plants (Figure 2-2). The Gowen Field plant serves the area



N
0
5
10
MILES
PAYETTE CO.
GEM CO.
CANYON CO.
BOISE CO.
ADA CO.
BOISE FRONT
Willow
Cr.
Dry Cr.
BOISE RIVER
STAR
EAGLE
CALDWELL
MERIDIAN
BOISE
BOISE VALLEY
NAMPA
LAKE LOWELL
Indian
Fivemile
Tenmile
Cr.
LUCKY PEAK LAKE
CANYON CO.
ADA CO.
Kuna
Mora Canal
SNAKE RIVER VALLEY
SNAKE RIVER
MOUNTAIN HOME PLATEAU
-LEGEND-
BOISE VALLEY BOUNDARY
SOUTHWEST COMMUNITY STUDY AREA
IDAHO
INDEX MAP

ADAPTED FROM NACE, 1955
BASE MAP: USGS 1:250,000 "BOISE", REVISED 1976

FIGURE 2-1. REGIONAL SETTING

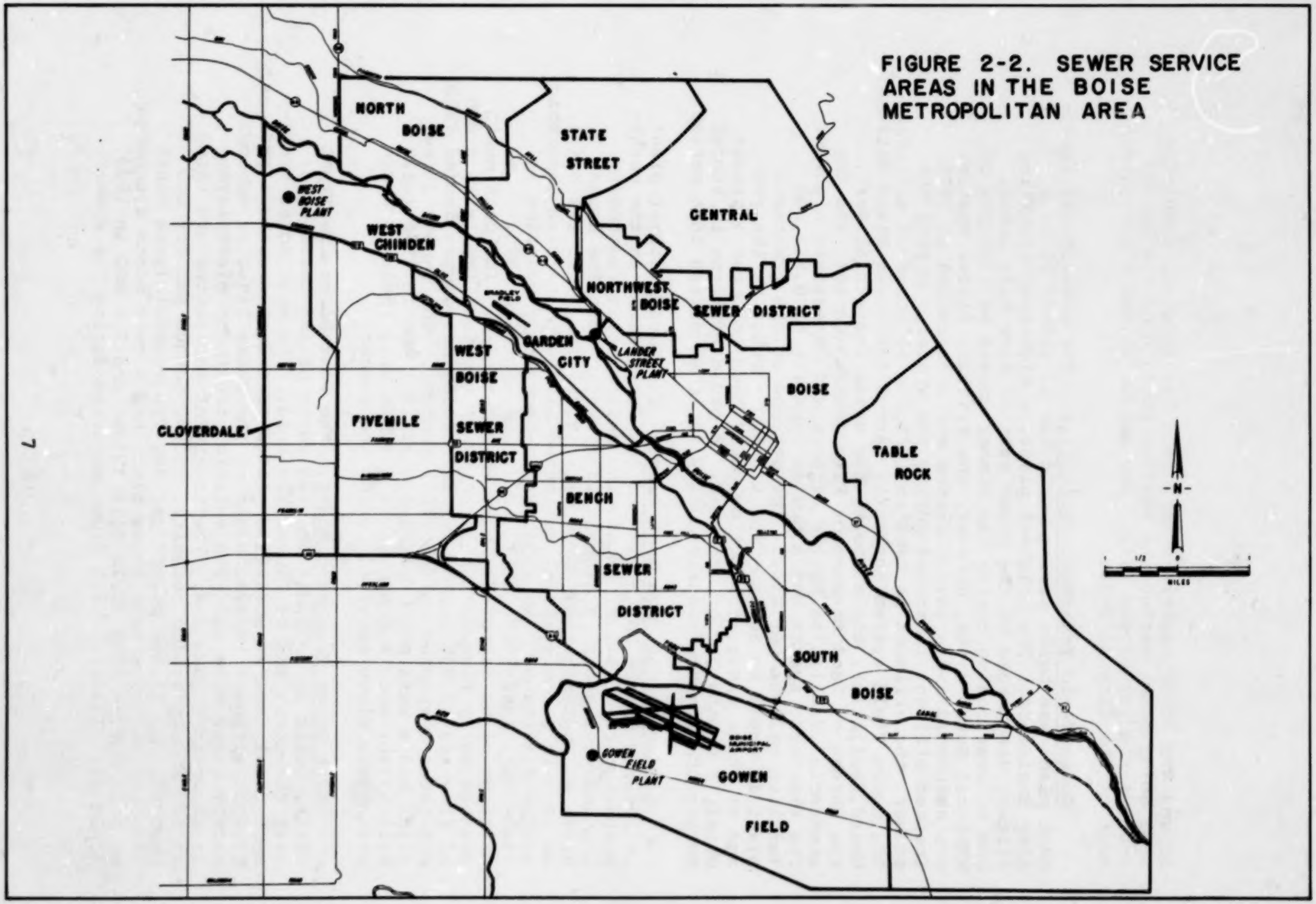


FIGURE 2-2. SEWER SERVICE AREAS IN THE BOISE METROPOLITAN AREA

NORTH BOISE
STATE STREET
CENTRAL
WEST BOISE PLANT
WEST CHINDEN
NORTHWEST BOISE
SEWER DISTRICT
BRADLEY FIELD
GARDEN CITY
LANDER STREET PLANT
WEST BOISE SEWER DISTRICT
BOISE
TABLE ROCK
CLOVERDALE
FIVEMILE
BENCH SEWER DISTRICT
SOUTH BOISE
BOISE MUNICIPAL AIRPORT
GOWEN FIELD PLANT
GOWEN FIELD
N
1/2
0
1
MILES

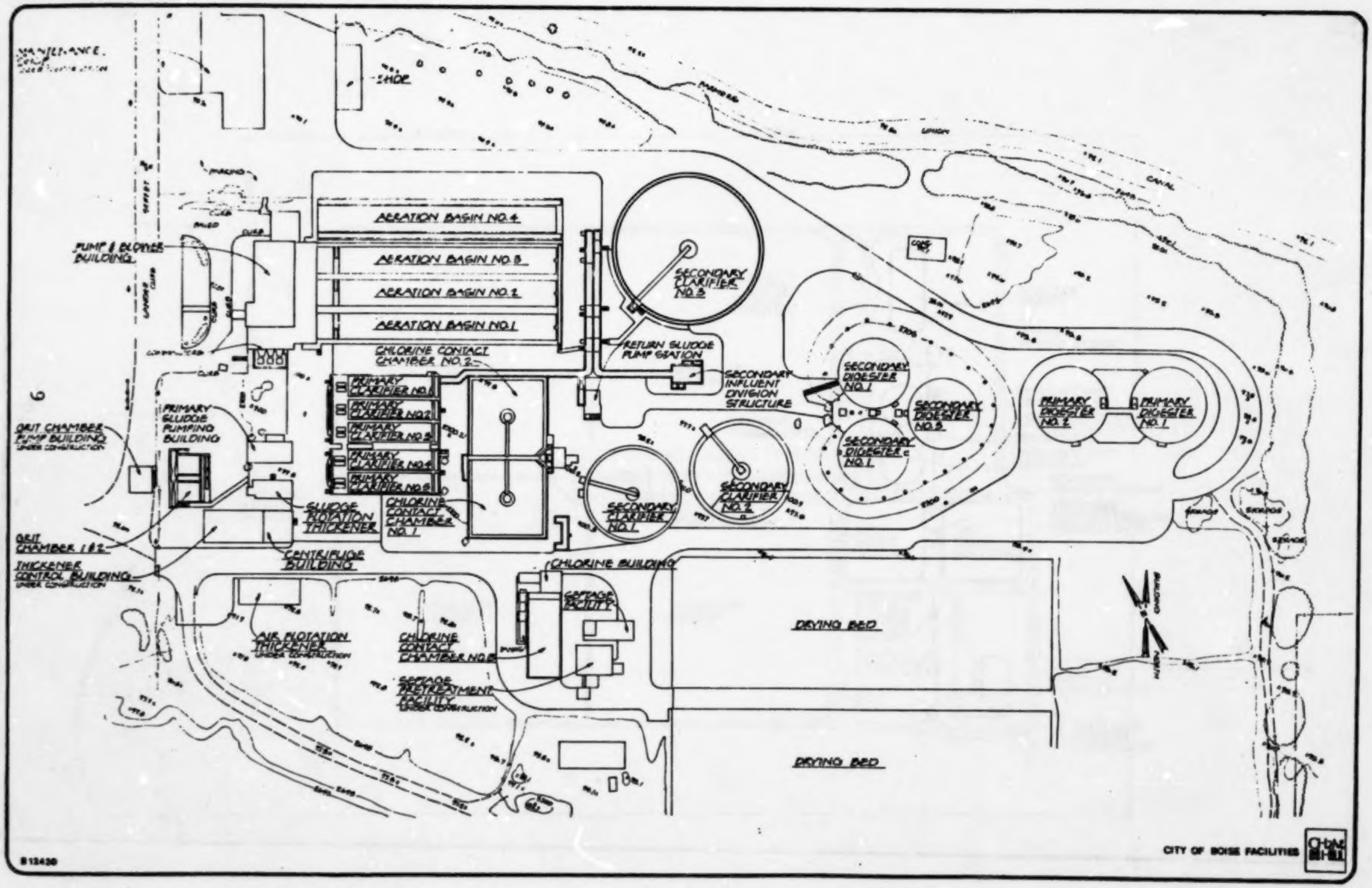
around the Boise municipal airport. The recently completed West Boise plant serves the western portion of the Boise area, including Garden City. The Lander Street plant serves most of the City of Boise.

Gowen Field Treatment Facilities. The Gowen Field treatment plant was built during World War II (1942) by U. S. Army Engineers. The original plant, a high-rate trickling filter, discharged to the upper part of Five Mile Creek. Due to overloading during the summer caused by training of National Guard units, however, the tricking filter system was abandoned and a lagoon system was constructed in 1976. Treated effluent is stored during the winter. During the summer, the effluent is used to irrigate 47 acres of alfalfa. The Gowen Field system currently serves the Gowen Field National Guard facilities, the airport, the Boise Industrial Park, the Bureau of Land Management Fire Control Center, and the commercial facilities by the airport and interstate highway. The treatment system has a design capacity of 0.512 MGD (million gallons per day). The storage at the treatment plant is ample to accommodate 0.5 MGD throughout the year, and at these flows, irrigation would have to occur approximately 7 months out of the year. Because effluent is stored during the winter, plant capacity is lower during that period.

Lander Street Treatment Plant. The Lander Street plant is located on the north side of the Boise River in the northwestern part of Boise. Following chlorination, secondary treated wastewater is discharged directly into the Boise River at approximately River Mile 49.7. The plant was built in 1950 as a conventional activated sludge plant with anaerobic sludge digestion. The plant was subsequently modified in 1960-1961, 1968-1969, 1971, 1973, and again in 1975. The existing plant layout is shown in Figure 2-3. The peak month average daily flow design capacity of the facility is 15.0 MGD of flow and 23,000 pounds per day biological oxygen demand (BOD) and total suspended solids (TSS) removal. The Lander Street plant had a peak month discharge of 13.1 MGD in 1978 (CH2M Hill 1979b) and 14.6 MGD in 1979 (CH2M Hill 1980a). These peak month flows occurred during the summer.

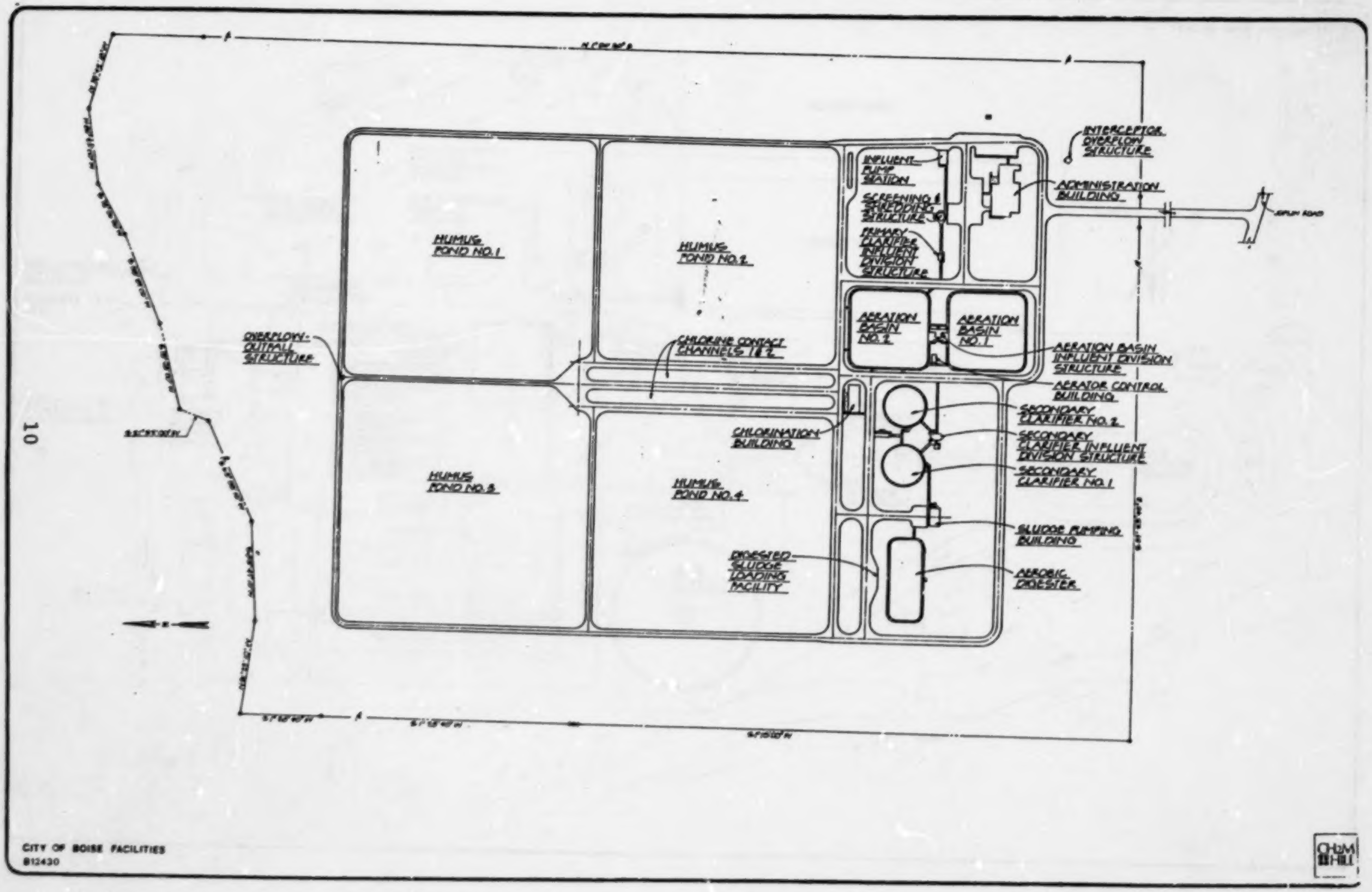
West Boise Treatment Plant. The West Boise treatment plant, built in 1975, is located south of the Boise River near the north end of Cloverdale Road. The West Boise treatment plant uses an activated sludge secondary treatment process. Treated effluent is discharged to the Boise River at approximately River Mile 45. The existing treatment plant layout is shown in Figure 2-4. The treatment facilities are rated at 6.3 MGD hydraulic capacity, 15,000 pounds per day BOD removal, and 15,000 pounds per day TSS removal (peak month flow basis). The West Boise plant had a peak month discharge of 5.28 MGD in 1978 (CH2M Hill 1979b) and 7.4 MGD in 1979 (CH2M Hill 1980a). Peak flows occurred during the summer.

Figure 2-3. Lander Street Treatment Plant Site Plan


MAINTENANCE SHOP
SHOP
PUMP & BLOWER BUILDING
AERATION BASIN NO. 4
AERATION BASIN NO. 3
AERATION BASIN NO. 2
AERATION BASIN NO. 1
CHLORINE CONTACT CHAMBER NO. 2
PRIMARY CLARIFIER NO. 1
PRIMARY CLARIFIER NO. 2
PRIMARY CLARIFIER NO. 3
PRIMARY CLARIFIER NO. 4
PRIMARY CLARIFIER NO. 5
CHLORINE CONTACT CHAMBER NO. 1
SLUDGE FLOTATION THICKENER
PRIMARY SLUDGE PUMPING BUILDING
GRIT CHAMBER PUMP BUILDING UNDER CONSTRUCTION
GRIT CHAMBER 1 & 2
THICKENER CONTROL BUILDING UNDER CONSTRUCTION
CENTRIFUGE BUILDING
SECONDARY CLARIFIER NO. 3
RETURN SLUDGE PUMP STATION
SECONDARY INFLUENT DIVISION STRUCTURE
SECONDARY CLARIFIER NO. 1
SECONDARY CLARIFIER NO. 2
SECONDARY DIGESTER NO. 1
SECONDARY DIGESTER NO. 3
SECONDARY DIGESTER NO. 1
PRIMARY DIGESTER NO. 2
PRIMARY DIGESTER NO. 1
CANAL
UNION
CHLORINE BUILDING
SEPTAGE FACILITY
AIR FLOTATION THICKENER UNDER CONSTRUCTION
CHLORINE CONTACT CHAMBER NO. 3
SEPTAGE PRETREATMENT FACILITY UNDER CONSTRUCTION
DRYING BED
DRYING BED
NORTH
BUILDING
CITY OF BOISE FACILITIES
CH2M HILL
B13430

SOURCE: CH2M Hill 1979a.

Figure 2-4. West Boise Treatment Plant Site Plan


INTERCEPTOR OVERFLOW STRUCTURE
ADMINISTRATION BUILDING
INFLUENT PUMP STATION
SCREENING & SHREDDING STRUCTURE
PRIMARY CLARIFIER INFLUENT DIVISION STRUCTURE
HUMUS POND NO. 1
HUMUS POND NO. 2
HUMUS POND NO. 3
HUMUS POND NO. 4
AERATION BASIN NO. 1
AERATION BASIN NO. 2
AERATION BASIN INFLUENT DIVISION STRUCTURE
AERATOR CONTROL BUILDING
OVERFLOW-OUTFALL STRUCTURE
CHLORINE CONTACT CHANNELS 1 & 2
CHLORINATION BUILDING
SECONDARY CLARIFIER NO. 2
SECONDARY CLARIFIER INFLUENT DIVISION STRUCTURE
SECONDARY CLARIFIER NO. 1
SLUDGE PUMPING BUILDING
DIGESTED SLUDGE LOADING FACILITY
AEROBIC DIGESTER
CITY OF BOISE FACILITIES
B12430
CH2M HILL

SOURCE: CH2M Hill 1979a.

Eagle Sewer District

The existing sewage treatment facilities of the Eagle Sewer District (ESD) were constructed in 1965 and modified in 1975 and 1978. The plant site is located north of the Boise River, west of Eagle Road (Figure 2-5). The existing treatment system consists of two sewage lagoons and two sand filters.

Sewage is pumped into the first pond (1.2 acres) which is aerated by a perforated plastic pipe system. Effluent from the aerated lagoon flows into a second lagoon (1.8 acres) which does not have any special aeration system. The effluent flows by gravity to the sand filters (0.41 acre each). After percolating through 2 feet of sand, the effluent is collected by an underdrain system and discharged to the Boise River at river mile 42.5.

The existing facilities have a design capacity of 0.3 MGD for winter and 0.5 MGD for summer. Summer flows have averaged 0.35 MGD (peak summer flows of 0.425 MGD) with an average winter flow of 0.17 MGD (J-U-B Engineers 1980).

Southwest Community Wastewater Management Study

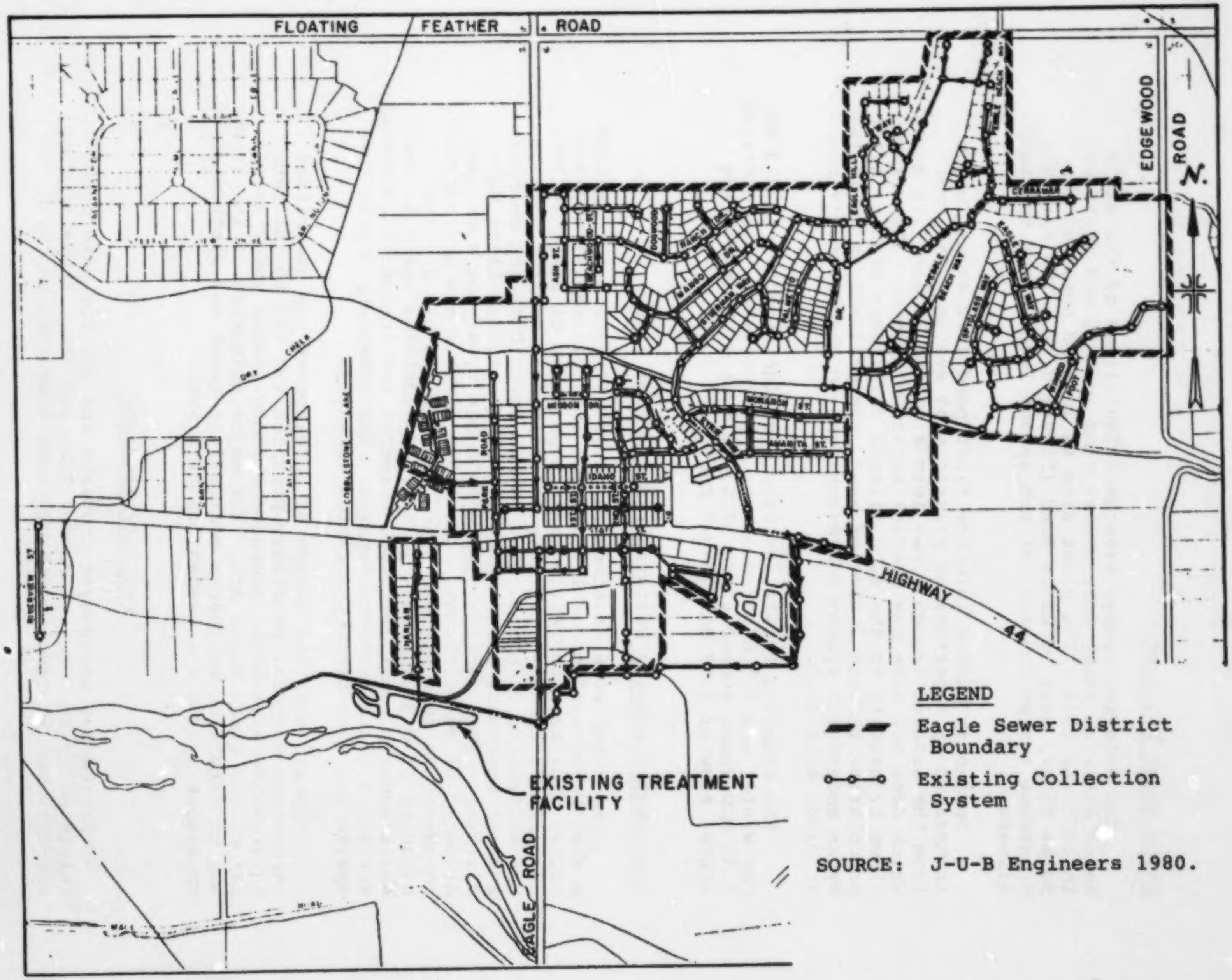
The rural area southwest of Boise (Figure 2-6) contains a mixture of agricultural and large lot residential developments. The area currently has a population of about 16,700. Most residents currently rely on individual septic tanks for wastewater disposal. The Owyhee Sewer District operates a small treatment plant which serves the Indian Lakes subdivision. This facility employs lagoon treatment with land disposal of the effluent. About 920 dischargers are currently connected to this system. The Owyhee plant has a design capacity of 0.35 MGD (APA 1979a). In addition there is one small package plant (extended aeration and drainfield disposal) serving a truck stop development. One community septic tank system has also been constructed recently.

Concern over the nature of development and associated wastewater disposal practices prompted the APA to initiate an areawide wastewater management study funded under Section 208 of the Clean Water Act. The major objective of the study was to determine whether a centralized sewer and wastewater treatment system was needed for this area.

Facility Problems

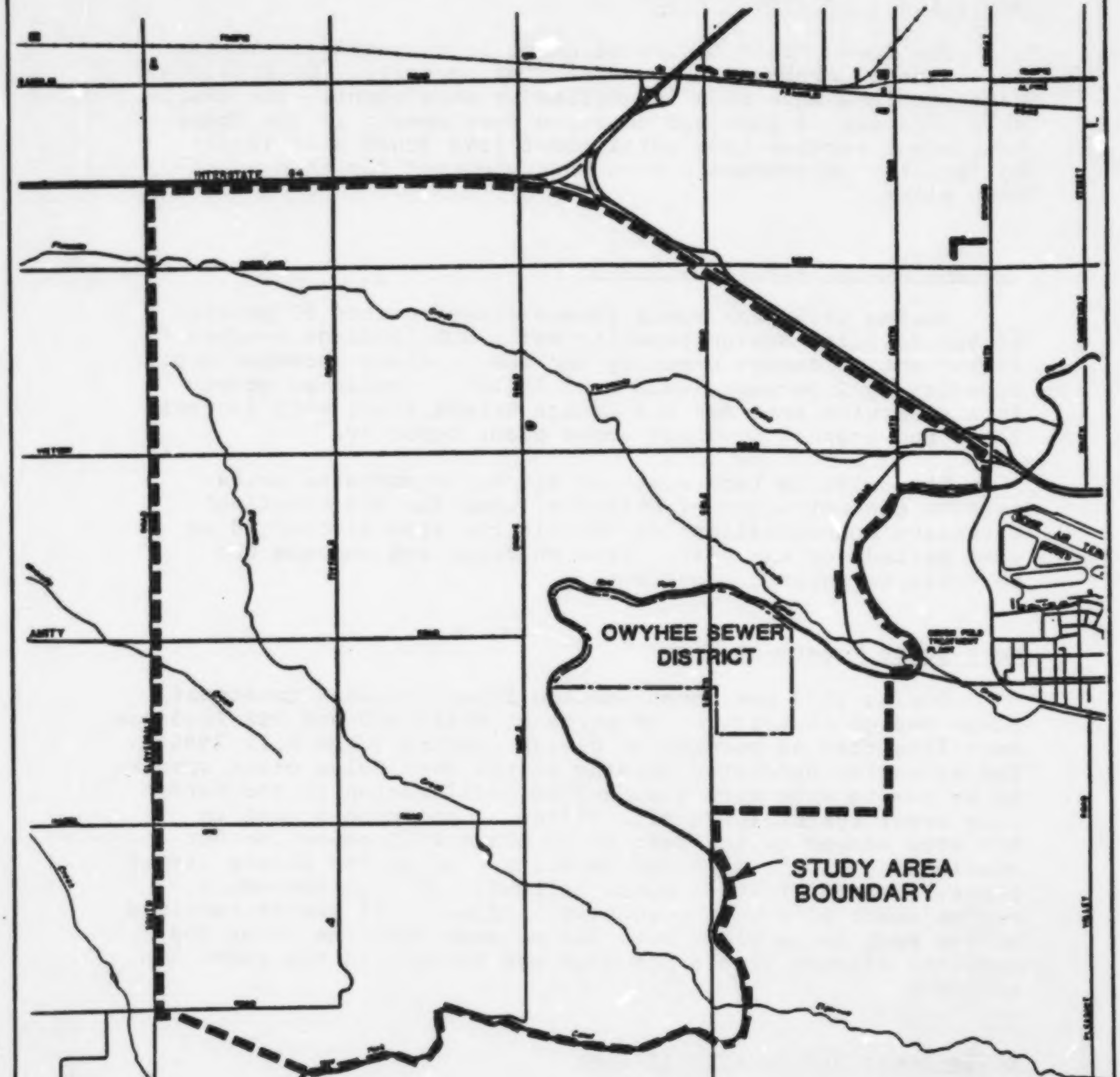
Wastewater management projects and studies have been initiated by the City of Boise, ESD, and APA. These studies are intended to resolve the problems discussed below.

Figure 2-5. Eagle Sewer District Facilities


FLOATING FEATHER ROAD
EDGEWOOD ROAD
N.
HIGHWAY 44
EAGLE ROAD
EXISTING TREATMENT FACILITY
ASH ST.
DOGWOOD
PALMETTO
PEBBLE BEACH WAY
MONARCH ST.
AMARITA ST.
IDAHO ST.
STATE ST.
PARK ROAD
COBBLESTONE LANE
DRY CREEK
RIVERVIEW ST
HARLAN
CERAMAR
LEGEND
Eagle Sewer District Boundary
Existing Collection System

SOURCE: J-U-B Engineers 1980.

Figure 2-6. Southwest Community Wastewater Management Study Area


INTERSTATE 84
VICTORY
AMITY
OWYHEE SEWER DISTRICT
STUDY AREA BOUNDARY

SOURCE: Ada Planning Association 1979a

Gowen Field Treatment Plant

The Gowen Field treatment plant is currently operating at an annual average of 40 percent of capacity. No significant problems have been identified at this plant. The available capacity is expected to serve development in the treatment plant service area until about 1995 (CH2M Hill 1980a). No facility improvements have been proposed for this treatment plant.

Lander Street Treatment Plant

During 1979 peak month sewage flows reached 97 percent of the facility design capacity while BOD loadings reached 94 percent of design capacity and TSS loadings exceeded design capacity by 2 percent (CH2M Hill 1980a). Continued growth in the service area for the Lander Street plant will increase flows and organic loadings above plant capacity.

The existing Lander Street discharge contains an excessive concentration of chlorine (used for disinfection). Excessive concentrations of ammonia are also discharged at some periods of the year. Both chlorine and ammonia can be toxic to aquatic organisms.

West Boise Treatment Plant

During 1979 peak month sewage flows exceeded treatment plant design capacity by 18 percent, while BOD and TSS loadings were less than 40 percent of design capcity (CH2M Hill 1980a). The excessive hydraulic loading at the West Boise plant appears to be due to very high groundwater infiltration in the Garden City sewer system (CH2M Hill 1979a). Continued growth in the area served by the West Boise plant will cause further overloading of the existing capacity. As at the Lander Street plant, treated effluent contains levels of chlorine which may be toxic to aquatic organisms. Industrial wastes received at the West Boise plant have led to some concerns about the combined effects of heavy metals and ammonia in the plant effluent.

Eagle Sewer District Facilities

With the recent construction of sand filters at the existing plant, effluent quality has improved significantly. These sand filters, however, are designed for only a few years of use. Thus future effluent quality problems are expected. Future development in the area served by the existing plant could also create an excessive load on the facilities.

Southwest Community Area

The Southwest Community Sewer Feasibility Study undertaken by APA was initiated primarily due to concerns about possible groundwater pollution from septic tanks. The major concern focused on nitrate and nitrite levels in the local groundwater systems. In addition, there was growing concern for growth impacts upon other public service needs in the area. The feasibility study provided a mechanism to coordinate the areawide land use planning and the planning for key public services for the Southwest area.

Chapter 3

PROJECTS PROPOSED FOR CONSTRUCTION

Introduction

Wastewater treatment alternatives have been evaluated for three areas: the City of Boise, the Eagle Sewer District, and the unincorporated Southwest Area of Ada County. These alternatives are discussed in Chapter 4. The recommended projects are described below.

City of Boise Facilities

The proposed project for the City of Boise includes several elements affecting both the Lander Street and West Boise treatment plants. No changes would be made at the Gowen Field treatment plant. The facility plan for Boise envisions a two-stage program of construction. Clean Water Act grant funds being requested at this time would be used for "Stage 1" construction. Major aspects of the proposed project are discussed below.

Facility Expansions and Service Area Changes

A major element of the facility plan for the City of Boise involves providing sewage treatment plant capacity for future growth. The proposed project will involve major new construction at the West Boise treatment plant and only minor facility changes at the Lander Street plant. The facility plan also proposes the staged construction of a South Boise Interceptor. Following Stage 1 construction, sewage flows from the Bench Sewer District, currently treated at the Lander Street plant, will be treated at the expanded West Boise plant. Following Stage 2 construction, sewage flows from the Table Rock and South Boise sewer service areas would be diverted from the Lander Street Plant to West Boise. These shifts in sewer service areas contributing to the different treatment plants will free existing capacity at the Lander Street plant to handle future growth in the Central Boise and Northwest Boise Sewer District service areas (Figures 3-1, 3-2, and 3-3).

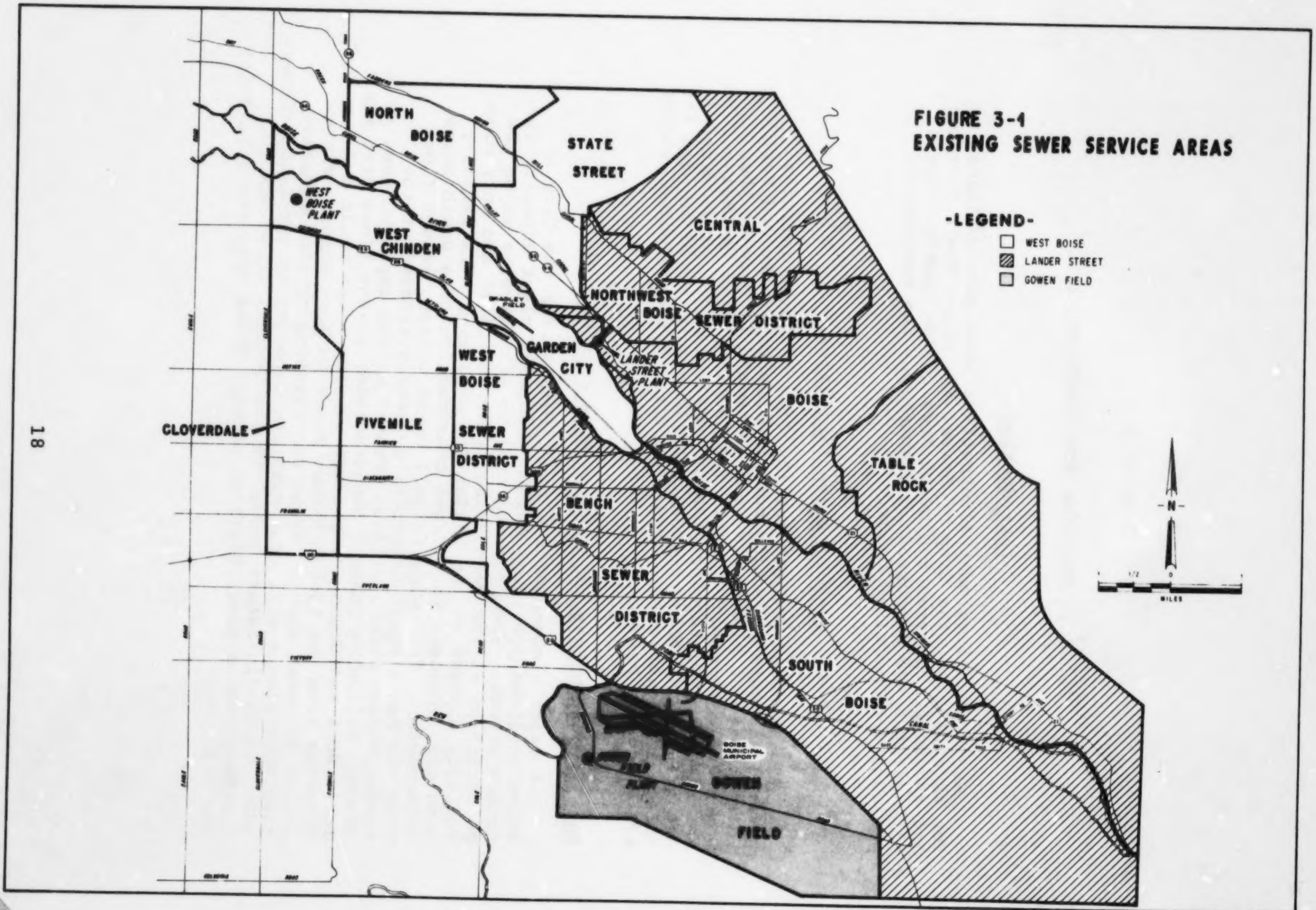
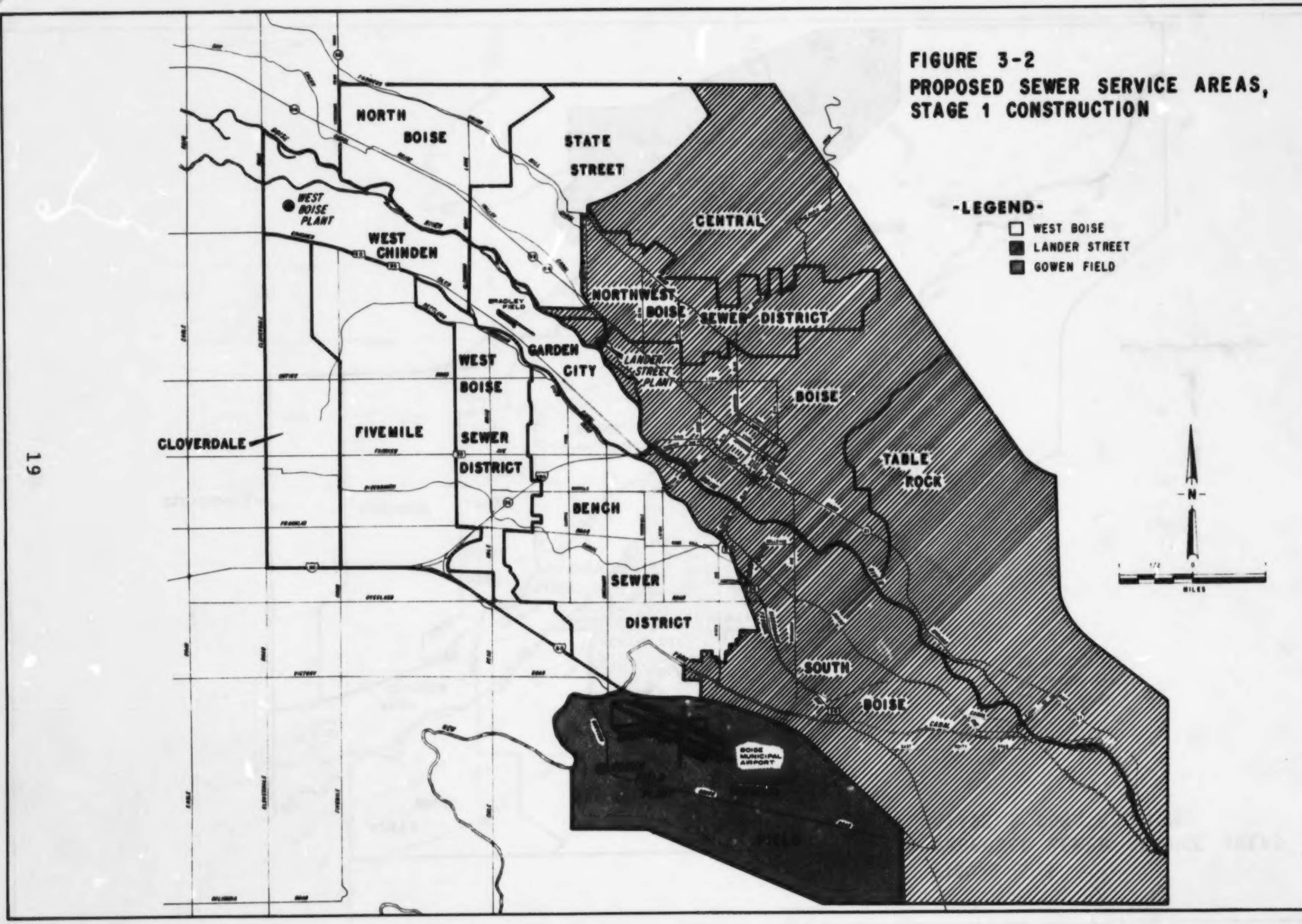


FIGURE 3-4
EXISTING SEWER SERVICE AREAS

-LEGEND-
☐ WEST BOISE
▨ LANDER STREET
☐ GOWEN FIELD
NORTH BOISE
STATE STREET
CENTRAL
NORTHWEST BOISE SEWER DISTRICT
WEST BOISE PLANT
WEST CHINDEN
GARDEN CITY
LANDER STREET PLANT
WEST BOISE SEWER DISTRICT
FIVEMILE
CLOVERDALE
BOISE
TABLE ROCK
BENCH SEWER DISTRICT
SOUTH BOISE
BOISE MUNICIPAL AIRPORT
GOWEN FIELD
-N-
1/2
0
MILES

FIGURE 3-2
PROPOSED SEWER SERVICE AREAS,
STAGE 1 CONSTRUCTION


-LEGEND-
☐ WEST BOISE
▨ LANDER STREET
▨ GOWEN FIELD
N
1/2
0
MILES
NORTH BOISE
STATE STREET
CENTRAL
WEST BOISE PLANT
WEST CHINDEN
NORTHWEST BOISE SEWER DISTRICT
BRADLEY FIELD
GARDEN CITY
LANDER STREET PLANT
BOISE
WEST BOISE SEWER DISTRICT
FIVEMILE
CLOVERDALE
TABLE ROCK
BENCH SEWER DISTRICT
SOUTH BOISE
BOISE MUNICIPAL AIRPORT

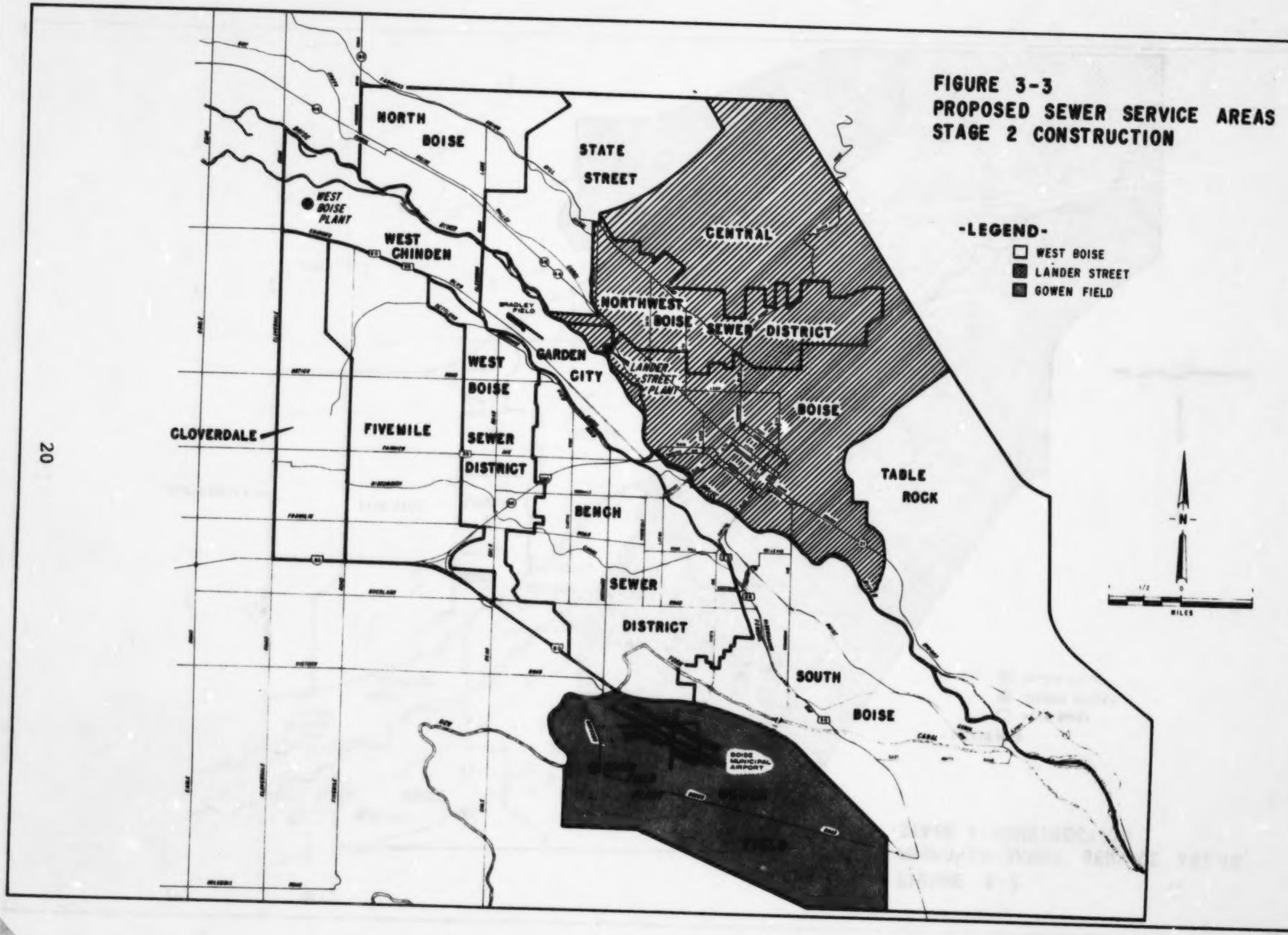


FIGURE 3-3
PROPOSED SEWER SERVICE AREAS
STAGE 2 CONSTRUCTION

-LEGEND-
☐ WEST BOISE
▨ LANDER STREET
■ GOWEN FIELD
N
1/2
0
MILES
NORTH BOISE
STATE STREET
CENTRAL
NORTHWEST BOISE SEWER DISTRICT
WEST BOISE PLANT
WEST CHINDEN
BRADLEY FIELD
GARDEN CITY
LANDER STREET PLANT
BOISE
TABLE ROCK
WEST BOISE SEWER DISTRICT
CLOVERDALE
FIVEMILE
BENCH SEWER DISTRICT
SOUTH BOISE
BOISE MUNICIPAL AIRPORT

Lander Street Treatment Plant Modification

Stage 1 modifications at the Lander Street plant will involve installation of dechlorination and postaeration facilities and a variety of measures to increase the use of digester gas from the anaerobic sludge digesters.

Dechlorination facilities will involve the use of sulfur dioxide (SO_2) gas dissolved in water. The resulting sulfurous acid solution will be mixed into the treated and disinfected sewage effluent. Residual chlorine in the disinfected effluent will be rapidly reduced to nontoxic forms such as chloride ions.

Treated sewage effluent generally has little dissolved oxygen. The dechlorination process will further reduce dissolved oxygen levels. A postaeration process will be installed to increase oxygen levels in the treated effluent prior to discharge to the Boise River. The facility plan recommends converting chlorine contact basin No. 3 into a postaeration basin using static tube aerators.

Following these modifications, the Lander Street treatment plant capacity will remain essentially unchanged from present conditions.

Methane gas produced by the anaerobic sludge digesters is currently used as fuel for raw sewage pumps, aeration system blowers, and winter heating of sludge digesters. Currently about 72 percent of digester gas production is utilized at the Lander Street plant. The remaining gas production is lost through leaks or intentional flairing of excess gas production. Several options to the existing pattern of digester gas use are being evaluated, and specific recommendations are presented in the draft facility plan.

West Boise Treatment Plant Modifications

A major expansion program is recommended for the West Boise plant. This expansion will accommodate future growth in the Boise area as well as the shifting of various existing sewage flows from the Lander Street plant as the South Boise Interceptor is built. Capacity expansion will be phased, with the Stage 1 expansion adding 10.7 MGD of capacity (peak month average daily flow basis) to the existing 6.3 MGD system. It is anticipated that a second expansion stage would occur in about 1988, adding an additional 17 MGD of capacity.

Stage 1 expansion at West Boise will involve an additional influent pump, grit chambers, an additional comminuter, two primary clarifiers, two additional secondary clarifiers, additional aeration at the existing aeration basins, dechlorination facilities, a new flotation thickener, new primary and secondary anaerobic sludge digesters, various sludge and grit pumps, and a digester control building. A significant aspect of the proposed West Boise plant modification involves replacing the existing aerobic sludge digestion system with an anaerobic digestion system.

Stage 2 expansion would essentially involve construction of a duplicate treatment facility adjacent to the Stage 1 facilities. Stage 2 construction would involve a new influent pump station, headworks facilities (grit chambers, comminuters, etc.), primary clarifiers, aeration basins, secondary clarifiers, chlorine contact chambers, postaeration facilities, primary and secondary sludge pumping, sludge thickeners, and anaerobic sludge digesters.

As outlined in the draft Facilities Plan (CH2M Hill 1980b), the West Boise plant would have a hydraulic capacity of 34 MGD (peak month average daily flow basis) following Stage 2 construction. The Idaho Department of Health and Welfare has indicated that state and federal grant funding will probably be based on a 20-year sewage flow of 23.5 MGD (Korpalski, 1981); additional capacity would be locally funded.

Sludge Disposal

Digested sludge from the Lander Street plant is currently used as soil conditioner. The liquid digested sludge from the Lander Street plant is presently trucked to agricultural areas near Eagle and the Idaho State Prison (south of Boise). The aerobically digested sludge from the West Boise plant is presently stored and dried in humus ponds at the plant site.

Conversion at the West Boise plant to anaerobic sludge digestion will allow agricultural use of sludge from both the Lander Street and West Boise plants. Current plans involve transporting digested sludge by pipeline to the Idaho State Prison area for use as soil conditioner on the prison farm. Alternative pipeline routes are shown in Figure 3-4. The recommended routing involves the Phillippi alignment.

Interceptor Systems

Two interceptor system expansions were evaluated as part of the facility planning process. The South Boise Interceptor would shift sewage flows from the Lander Street

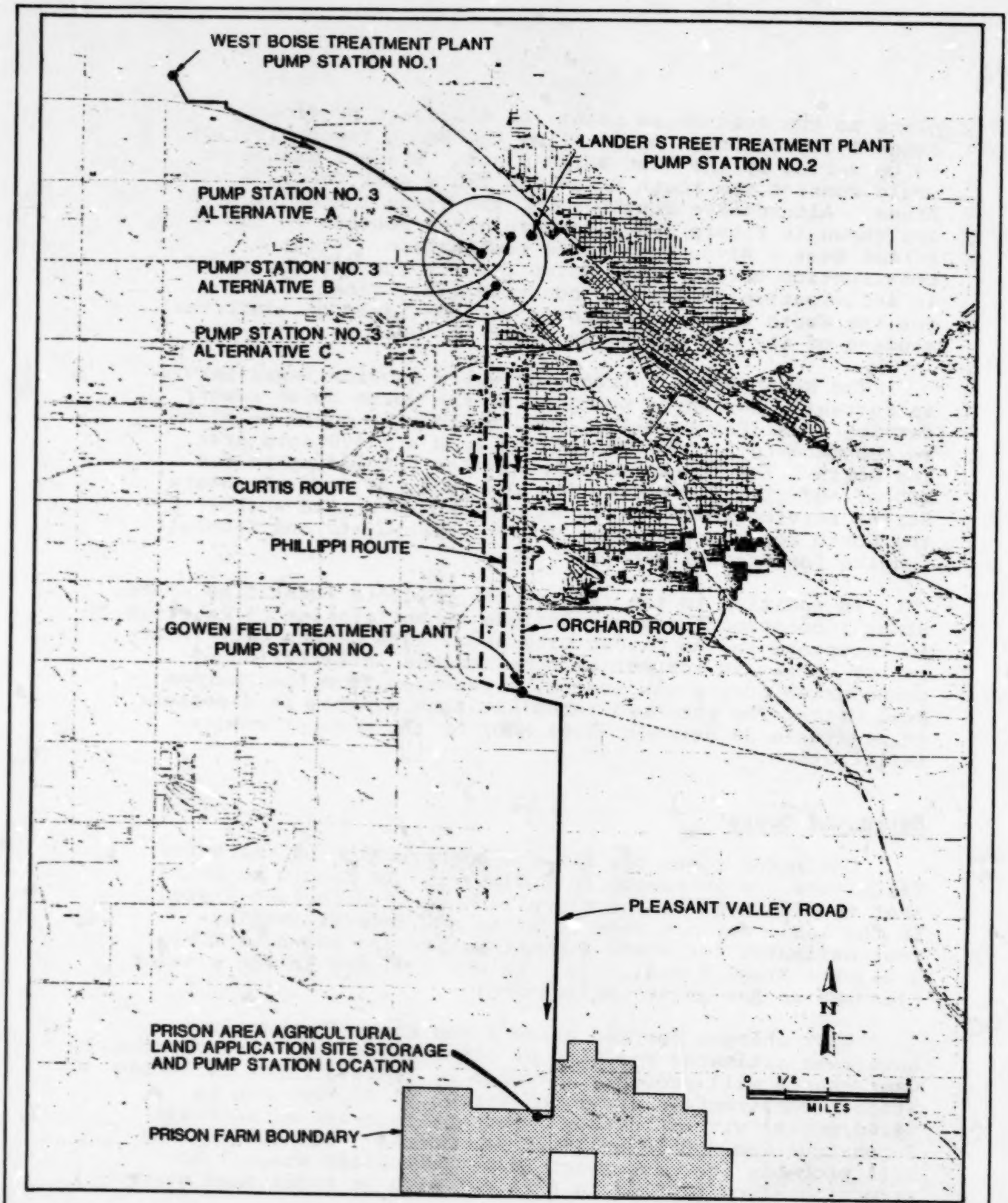

WEST BOISE TREATMENT PLANT
PUMP STATION NO.1
LANDER STREET TREATMENT PLANT
PUMP STATION NO.2
PUMP STATION NO. 3
ALTERNATIVE A
PUMP STATION NO. 3
ALTERNATIVE B
PUMP STATION NO. 3
ALTERNATIVE C
CURTIS ROUTE
PHILLIPPI ROUTE
GOWEN FIELD TREATMENT PLANT
PUMP STATION NO. 4
ORCHARD ROUTE
PLEASANT VALLEY ROAD
N
0
1/2
1
2
MILES
PRISON AREA AGRICULTURAL
LAND APPLICATION SITE STORAGE
AND PUMP STATION LOCATION
PRISON FARM BOUNDARY

FIGURE 3-4. SLUDGE PIPELINE ROUTING & LAND APPLICATION SITE

plant to the West Boise plant, as discussed previously. Stage 1 construction would allow the Bench Sewer District to be served by the West Boise plant. Stage 2 expansion would connect the South Boise and Table Rock Sewer Service Areas. Alternative routings for the Stage 1 construction are shown in Figure 3-5. The preferred routing is the Inland East - River West route combination. Stage 1 construction of the South Boise Interceptor will be sized in anticipation of Stage 2 construction. Final sizing for the South Boise Interceptor will be based on additional studies of the overall Boise sewer system.

The North Boise Interceptor would provide sewer service to currently unsewered portions of the North Boise sewer service area (Figure 3-1). The interceptor would be sized to accommodate 11,000 connections from a 2,400-acre area. The North Boise Interceptor would also provide up to 5.6 MGD of additional capacity for sewage flows from the State Street service area. It is at present uncertain whether the North Boise Interceptor will receive state and federal funding for Stage 1 construction.

In addition to the interceptor projects identified above, Stage 1 construction would include rehabilitation of existing interceptors in the Garden City area. The Garden City interceptor system is subject to considerable infiltration of groundwater during the summer, apparently from the Thurman Mill Ditch. The proposed rehabilitation program is expected to eliminate 30 percent (1.04 MGD) of the present summer infiltration.

Estimated Costs

Estimated costs for Stage 1 construction of the Boise facilities are presented in Table 3-1. It should be noted that the North Boise and miscellaneous interceptors listed in the table may not receive state and federal funding. Cost estimates for Stage 2 construction are shown in Table 3-2. The Stage 2 facilities are not included in the present Clean Water Act grant application.

User charges for the Stage 1 and Stage 2 expansions have been estimated for City of Boise residents. The current user charge will probably increase by 11-12 percent following Stage 1 construction (from an average of $7.70/month to $8.60/month) with a further 7 percent increase after Stage 2 construction ($8.60 to $9.20 per month). Connection fees will probably increase about 34 percent after Stage 1 construction (from $165.00 to $221.00) with an additional minor

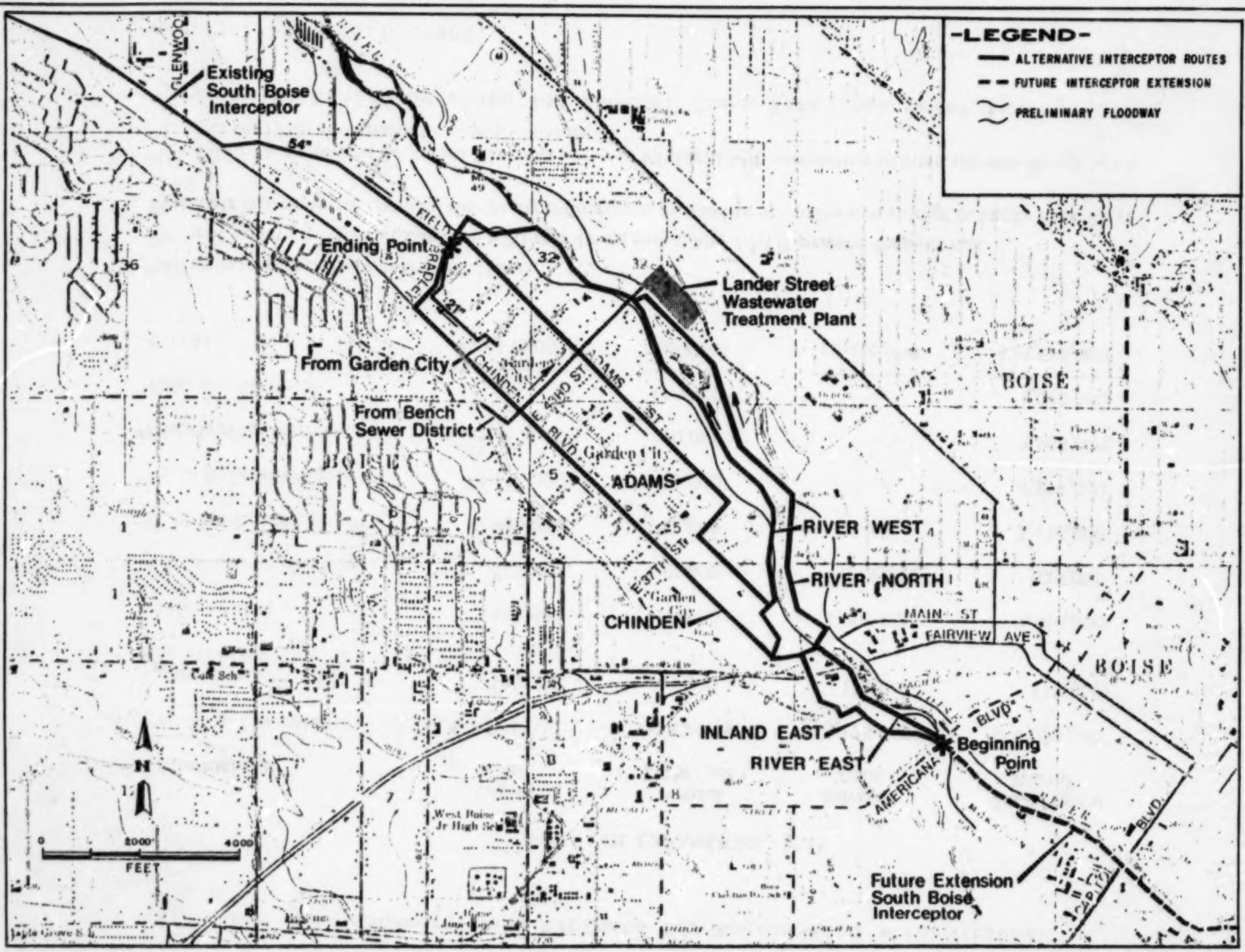

-LEGEND-
ALTERNATIVE INTERCEPTOR ROUTES
FUTURE INTERCEPTOR EXTENSION
PRELIMINARY FLOODWAY
Existing South Boise Interceptor
54"
Ending Point
32"
21"
Lander Street Wastewater Treatment Plant
From Garden City
From Bench Sewer District
ADAMS
RIVER WEST
RIVER NORTH
CHINDEN
INLAND EAST
RIVER EAST
Beginning Point
Future Extension South Boise Interceptor
MAIN ST
FAIRVIEW AVE
BOISE
BLVD
AMERICANA
GLENWOOD
FIELD
BRADLEY
CHINDEN
ADAMS ST
43RD ST
37TH ST
Garden City
N
0
2000
4000
FEET

FIGURE 3-5. ALTERNATIVE SOUTH BOISE INTERCEPTOR ROUTES

Table 3-1. Summary Cost Estimate for Recommended Alternatives[a]

STAGE ONE EXPANSIONS - 1983

Alternative	Capital Cost	Annual O&M Cost	Salvage Value	Total Present Worth[b]
West Boise Expansion	$ 8,295,000	$585,000/yr	$4,125,000	$ 9,620,000
Lander Street Improvements	196,000	41,000	118,000	518,000
Sludge Pipeline	3,463,000	66,000	1,795,000	3,660,000
Agricultural Application	584,000	39,000	378,000	839,000
South Boise Interceptor[d]	2,989,000	12,000	–	3,115,000
*North Boise Interceptor	4,151,000	16,000	–	4,319,000
*Miscellaneous Interceptors	2,461,000	10,000	–	2,566,000
Flow Augmentation	–	100,000[c]	–	1,049,000
TOTAL	$22,139,000	$869,000	$6,416,000	$25,686,000

[a] All estimates are in December 1980 dollars.

[b] Present worth estimates are based on a 20-year design period and a 7-1/8 percent discount rate.

[c] Estimate is preliminary and may change depending upon availability of unallocated storage in Lucky Peak Reservoir.

[d] Extension to Americana Boulevard (Construction may be staged with completion to intercept with Bench Sewer District by 1983, and remainder perhaps in Stage 2).

*May not be funded by state and federal Clean Water Act grant funds.

SOURCE: CH2M HILL 1980a.

Table 3-2. Summary Cost Estimate For Recommended Alternatives[a]

STAGE TWO EXPANSIONS - LATE 1980's

Alternative	Capital Cost	Annual O&M Cost	Salvage Value	Total Present Worth[b]
West Boise Expansion	$13,700,000	$1,135,000/yr	$6,350,000	$14,585,000
South Boise Interceptor[c]	2,147,000	8,000	–	2,231,000
TOTAL	$15,847,000	$1,143,000	$6,350,000	$16,816,000

[a] All estimates are in December 1980 dollars.

[b] Present worth estimates are based on a 20-year design period and a 7-1/8 percent discount rate.

[c] Extensions east of Americana Boulevard.

SOURCE: CH2M Hill 1980a.

increase after Stage 2 construction (from ($221.00 to $224.00). These user charges are preliminary estimates only, and do not apply to residents served by the Bench Sewer District or the Northwest Boise Sewer District.

Eagle Sewer District Facilities

The Eagle Sewer District (ESD) is proposing to abandon the existing facility site. A new facility would be constructed on a 65-acre site adjacent to the north channel of the Boise River, about 1 mile west (downstream) of the present site (Figure 3-6). The preferred project involves construction of a gravity flow interceptor from the existing site to the new site, pretreatment and lift station facilities, two aerated lagoons, an equalization lagoon, and an effluent pump station.

Effluent disposal is expected to involve a 35-acre rapid infiltration site about 0.4 mile east of Palmer Road and 0.3 mile south of Beacon Road. An underdrain system will collect the percolate and discharge it to an adjacent drainage ditch which eventually discharges to the Boise River. Effluent would be transported from the treatment plant site to the infiltration area by a 4-mile-long force main.

The overall ESD project would be staged, with the second aeration lagoon and three of the seven infiltration basins to be constructed in 1990. Initial project construction would provide 0.75 MGD of capacity (peak month average daily flow basis); this would be adequate to serve about 8,000 residents in the service area. Second-stage construction would bring treatment capacity to 1.31 MGD, sufficient for about 13,300 residents.

If the preferred rapid infiltration project proves to be infeasible, an oxidation ditch system would be constructed at the new treatment plant site. This treatment system would involve pretreatment and lift station facilities, an oxidation ditch with brush aerators, two secondary clarifiers, chlorination facilities, and a sludge basin. Treated effluent would be discharged to the north channel of the Boise River. Sludge from the clarifiers would be used as soil conditioner.

The cost estimate and funding procedures for the rapid infiltration alternative are shown in Table 3-3.

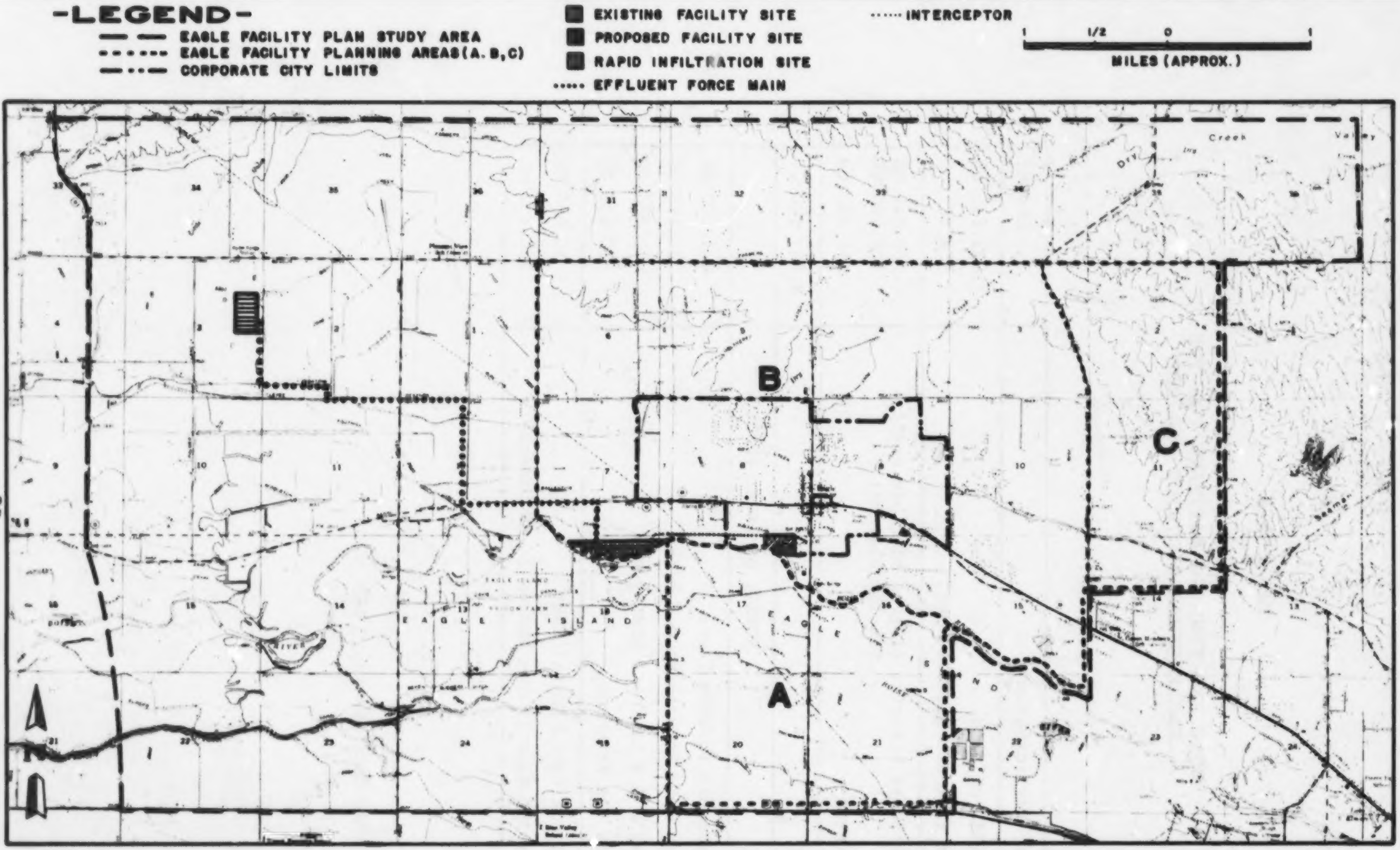

-LEGEND-
— — EAGLE FACILITY PLAN STUDY AREA
- - - - - EAGLE FACILITY PLANNING AREAS (A, B, C)
—·-·— CORPORATE CITY LIMITS
▨ EXISTING FACILITY SITE
▨ PROPOSED FACILITY SITE
▨ RAPID INFILTRATION SITE
····· EFFLUENT FORCE MAIN
······ INTERCEPTOR
1 1/2 0 1
MILES (APPROX.)
A
B
C
Dry Creek Valley
EAGLE ISLAND
EAGLE
RIVER

FIGURE 3-6. FACILITY PLANNING AREAS FOR THE EAGLE SEWER DISTRICT

TABLE 3-3

COST AND FUNDING ESTIMATE FOR THE EAGLE SEWER DISTRICT PROJECT

Agency Participation	Amount
EPA (75% of eligible cost)	2,893,815.00
State (15% of eligible cost)	578,763.00
Eagle Sewer District (10% of eligible cost)	385,842.00
(ineligible cost)	25,000.00
Sub Total	410,842.00
TOTAL	3,883,420.00
SOURCE OF LOCAL FUNDS	
Recommended Bonding Level	411,000.00
Yearly Bond Retirement @ 7 1/8%	39,168.00
Annual O & M Estimate (1st year)	71,500.00
Yearly Tax Revenues	-12,000.00
Total Estimated Annual Cost	98,668.00
Estimated User Charge (based on 800 users)	$10.28/Mo.

SOURCE: JUB Engineers, 1980

Southwest Area Wastewater Management

The Southwest Community Wastewater Management Study was performed in conjunction with revisions to the Ada County Comprehensive Plan. Adoption of a "rural lifestyle" land use plan for the Southwest Area dictates continued reliance on septic tank systems for wastewater management. The adopted Southwest Area Wastewater Management Plan (APA 1981) involves a county-wide voluntary septic tank maintenance program, a public information and education program, and recommendations for various other measures (Table 3-4).

Table 3-4. Southwest Community Wastewater Management Plan Recommendations

Tasks	Activities	Responsible Agencie(s)	Estimated Cost	Funding Sources
Installer's registration permit examination and training program	Revise and develop a more comprehensive exam for obtaining an installer's registration permit. Hold annual training workshops for local area installers and pumpers covering installation and O&M.	CDHD	-0-	Existing Program
Occupancy Permit Program	Ada County Building Department(ACBD) initiate a program of issuing occupancy permits on all structures prior to allowing occupancy; and establish a system of CDHD notification of Building Department of septic system installation approval prior to Building Department issuing occupancy permit.	APA CDHD ACBD	$6000 Ordinance Preparation	Phase II Grant
Central sewer system expansion mapping	Notifying of APA by municipalities and sewer districts when areas previously served by on-site systems are connected to central sewers. APA maintain and update map of central sewer and on-site system areas.	APA* CDHD Municipalities Sewer Districts	-0-	Existing 201/208 Programs
Septic tank pumping report procedures	CDHD develop, print and distribute septic tank pumping reporting forms with input from pumpers and APA. Municipalities (Meridian, Boise and Nampa) coordinate in administration of form collection and distribution to CDHD	CDHD* Boise City Meridian Nampa APA	-0-	Existing Programs**

Table 3-4 (cont'd.)

Tasks	Activities	Responsible Agencie(s)	Estimated Cost	Funding Sources
Septic tank pumping and installation computer data base	Develop system for APA input of log data provided by CDHD on septic tank pumping, installations and reinstallations into APA computer data bank. Prepare, print and distribute semi-annual reports.	APA* CDHD	$6000-$7000 Initial Startup	Phase II Grant
			$5500/yr On-Going	APA/CDHD existing 208 program, Ada County funding to APA/CDHD, pursue 201/208 grant funds
Public information leaflet	Initial preparation, printing and distribution; and on-going reprinting and distribution	CDHD* APA	-0-	Existing CDHD O&M Program
Homeowner's Manual	Initial preparation, distribution & printing	APA* CDHD	$5000-$6000	Phase II Grant
	Reprinting and on-going distribution	CDHD*	$1000-$1500/yr	Fee for manuals, contribution to program from installers and pumpers, 208 Sewage Ordinance Fees, CDHD existing program

*Lead Agency

**As mandated by the Ada County 208 Sewage Ordinance, the Central District Health Department (CDHD) has the responsibility to develop and implement the septic tank pumping reporting procedures.

SOURCE: APA 1981.

Chapter 4

WASTEWATER TREATMENT ALTERNATIVES

Introduction

The wastewater treatment projects discussed in Chapter 3 were selected from a larger number of alternatives evaluated during project planning. This chapter summarizes the alternatives identified in the various facility planning documents. Discharge requirements and sewage flow projections used for facility planning purposes are also discussed.

City of Boise Facilities

The facilities planning effort for the City of Boise has been focused on a number of aspects: 1) expansion of treatment facilities at the existing Lander Street or West Boise wastewater treatment plants, 2) modification of treatment processes (i.e., nitrification and organics removal), 3) infiltration and inflow studies of Garden City and Boise City, 4) interceptor systems, 5) sewage sludge management, and 6) augmentation of stream flows in the Boise River.

In the preliminary draft facilities plan prepared by CH2M Hill, it was assumed that the unincorporated Southwest community would be served by the West Boise treatment plant; however, during development of the Southwest Community Wastewater Management Study by APA, a decision was made not to provide central sewers to this area. Data from the Boise facilities plan have been adjusted in this EIS to reflect that decision. Additionally, alternatives for the Southwest community are discussed separately herein.

The development of facilities alternatives is typically influenced by two major considerations: required levels of wastewater treatment (discharge requirements) and required facility capacity.

Discharge Requirements

The Idaho Department of Health and Welfare has established water quality standards for the Boise River. These standards (discussed in Chapter 11) are intended to protect a variety of beneficial uses in the Boise River. These water quality standards have in turn been used to set requirements for the level of treatment at the Lander Street and West Boise wastewater treatment plants. These discharge requirements are shown in Table 4-1.

Table 4-1. Boise Treatment Plan Effluent Limitations Future and Historical

Parameter	Future Limitation	Historical Limitations			
			West Boise		
	Both Lander St. & West Boise	Lander St.	Boise River Less than 120 cfs[a]	Boise River Less than 170 cfs[a]	Boise River Greater than 170 cfs[a]
BOD	20 mg/l	20 mg/l	20 mg/l	30 mg/l	30 mg/l
TSS	30 mg/l	30 mg/l	30 mg/l	30 mg/l	30 mg/l
Dissolved Oxygen	6 mg/l or 75%	–	90%	90%	80%
Fecal Coliform					
Irrigation (Recreation) Season	50/100 ml	50/100 ml	–	–	200/100 ml
Non-Irrigation Season	100/100 ml	50/100 ml	50/100 ml	100/100 ml	200/100 ml
Chlorine Residual	0.1 mg/l	0.6 mg/l	0.4 mg/l	0.6 mg/l	0.6 mg/l
Ammonia Nitrogen	Varies	18 mg/l	3.4 mg/l	3.4 mg/l	3.4 mg/l

[a] Boise River flow measured at Capitol Boulevard

SOURCE: CH2M Hill 1980c.

Staging and Capacity Considerations

EPA regulations (U. S. EPA 1978a) provide basic guidance for estimating future wastewater facility needs. Overall planning is based on a 20-year planning period. In many cases, however, actual facility construction will occur in stages during this 20-year period. Facility planning for the City of Boise involved projecting future sewage flows and waste loads for the year 2000. Separate projections were made for different subareas of the Boise area. Population forecasts for these subareas were taken from the forecasts used by the APA (1978a).

Existing sewage flows and sewage generation rates were determined from water usage data and special studies of sewage flows in major trunk sewers. Separate estimates were made for residential, commercial, industrial, and infiltration flow components. Projections for the year 2000 assumed that there would be an increase in per capita or per acre sewage generation rates for most flow components in most subareas. These sewage generation rates (Table 4-2) do not incorporate any water conservation measures, but do reflect programs to control infiltration in the Garden City area.

Existing and projected sewage flows are shown in Table 4-3. The projected residential flows are based on the population projections shown in Table 4-4. These projections assume that all new development will be sewered and that all existing unsewered development will be connected during the next 20 years. While the total population of the Boise area is projected to increase by 68.6 percent between 1978 and 2000, the facility plan anticipates a 120 percent increase in the number of residents actually connected to the treatment plants.

Projected wastewater flows from commercial and industrial development were based on projections of commercial and industrial acreage for the year 2000 (Table 4-5). Existing commercial and industrial acreages were derived from the 1978 zoning plan for the City of Boise (CH2M Hill 1980c). Commercial acreage was projected to increase in direct proportion to population growth while future industrial acreage was estimated from the Boise Metropolitan Planning Area map (CH2M Hill 1980c).

Future infiltration flows were projected using the infiltration rates shown in Table 4-3. In general, increased infiltration rates are projected for all areas. A program to eliminate 1.0 MGD of infiltration from the Garden City area is assumed in the infiltration rates shown in Table 4-3.

Chapter 3 discussed the shifting of sewage flows from the Lander Street to the West Boise treatment plant. Projected sewage flows and waste loadings at these two plants are shown in Table 4-6.

Table 4-2. Sewage Generation Rates Used for the Boise Area

	Residential Flows (gpcd)		Commercial Flows (gpad)		Industrial Flows (gpad)		Infiltration/Inflow Rates			
							Average Month (gpad)		Peak Month (gpad)	
Subarea	1979	2000	1979	2000	1979	2000	1979	2000	1979	2000
West Boise Sewer District	62	65	800	800	1,000	1,000	25	150	50	250
Garden City	60	65	715	800	1,000	1,000	1,285	1,625	2,585	2,500
North Boise, State Street, West Chinden, Cloverdale, and Five Mile Sewer Service Areas	60	65	650	800	625	1,000	100	150	200	250
Bench Sewer District	61	65	900	900	1,200	1,200	55	150	165	250
Americana Blvd. Sewer Service Area	54	55	NA	900	NA	NA	55	150	165	250
South Boise Sewer Service Area	64	70	520	800	1,000	1,000	175	200 (150)[1]	250	500 (250)[1]
Table Rock Sewer Service Area	59	65	800	800	1,000	1,000	230	250 (150)[1]	400	1,000 (250)[1]
Central Boise Sewer Service Area	60	65	885	900	1,200	1,200	300	400	500	1,000
Northwest Boise Sewer District	55	60	670	800	NA	NA	100	150	250	500 (250)[1]

NOTES:

See Figure 2-2 for boundaries of sewer districts and sewer service areas; Americana Blvd. Sewer Service Area is part of the Bench Sewer District.
NA = not applicable
gpcd = gallons per capita per day
gpad = gallons per acre per day
[1] Value in parentheses applied only to new development after 1979.

DATA SOURCE: CH2M Hill 1980c.

Table 4-3. Existing and Projected Sewage Flows from Sewer Service Areas in Boise

	Wastewater Flow Component									
	Residential		Commercial		Industrial		Infiltration		Total	
Sewer Service Areas	1978	2000	1978	2000	1978	2000	1978	2000	1978	2000
	Annual Average Flows (MGD)									
North Boise; State Street; West Chinden; Cloverdale; Five Mile; Garden City; West Boise Sewer District	0.93	4.35	0.38	0.80	0.17	3.00	1.95	3.50	3.43	11.65
Bench Sewer District	1.71	2.30	0.47	0.55	0.30	0.30	0.27	0.75	2.75	3.90
Table Rock; South Boise	0.74	3.65	0.11	0.60	0.30	1.50	0.55	2.35	1.70	8.10
Central Boise; Northwest Boise Sewer District	2.38	3.65	1.00	1.15	0.56	0.60	2.13	3.25	6.07	8.65
TOTAL	5.76	13.95	1.96	3.10	1.33	5.40	4.90	9.85	13.95	32.30
	Peak Month Flows (MGD)									
North Boise; State Street; West Chinden; Cloverdale; Five Mile; Garden City; West Boise Sewer District	0.93	4.35	0.38	0.80	0.17	3.00	3.90	5.60	5.38	13.75
Bench Sewer District	1.71	2.30	0.54	0.55	0.30	0.30	0.81	1.25	3.36	4.40
Table Rock; South Boise	0.74	3.65	0.11	0.60	0.30	1.50	0.90	5.05	2.05	10.80
Central Boise; Northwest Boise Sewer District	2.38	3.65	1.02	1.15	0.58	0.60	3.62	7.60	7.60	13.00
TOTAL	5.76	13.95	2.05	3.10	1.35	5.40	9.23	19.50	18.39	41.95

NOTES:

MGD = million gallons per day
See Figure [illegible] for boundaries of sewer districts and sewer service areas.

DATA SOURCE: CH2M Hill 1980c.

Table 4-4. Population Projections for Sewer Service Areas Served by the Lander Street and West Boise Treatment Plants

	1978		1985		1990		1995		2000	
Sewer Service Area	Total	Sewered	Total	Sewered	Total	Sewered	Total	Sewered	Total	Sewered
North Boise; State Street; West Chindon; Cloverdale; Five Mile; Garden City; West Boise Sewer District	35,010	15,250	46,090	30,580	54,145	40,205	61,950	53,625	66,790	66,790
Bench Sewer District	31,410	28,700	33,060	31,125	33,270	31,980	34,110	33,465	35,805	35,805
Table Rock, South Boise	17,000	12,000	27,580	24,020	38,275	35,870	47,700	46,490	53,840	53,840
Central Boise; Northwest Boise Sewer District	42,390	40,500	46,420	45,035	49,285	48,300	52,560	52,040	55,710	55,710
TOTAL	125,810	96,450	153,150	130,760	174,975	156,355	196,320	185,620	212,145	212,145

See Figure 2-2 for boundaries of sewer service areas.

DATA SOURCE: CH2M Hill 1980c.

Table 4-5. Projected Commercial and Industrial Acreage in the Boise Area

	Commercial Area (acres)		Industrial Area (acres)	
Sewer Service Area	1978	2000	1978	2000
North Boise; State Street; West Chinden; Cloverdale; Five Mile; Garden City; West Boise Sewer District	565	800	215	1,360
Bench Sewer District	520	600	250	250
Table Rock, South Boise	190	750	265	1,430
Central Boise; Northwest Boise Sewer District	930	1,250	330	370
TOTAL	2,205	3,400	1,060	3,410

See Figure 2-2 for boundaries of sewer service area.

DATA SOURCE: CH2M Hill 1980c.

Table 4-6. Projected Sewage Flows and BOD Loads at the Lander Street and West Boise Sewage Treatment Plants

	Sewage Flows (MGD)				BOD Loads (lbs/day)			
Treatment Plant	1978	1985	1990	2000	1978	1985	1990	2000
				Annual Average				
Lander Street	10.50	10.30	7.40	8.65	16,900	15,370	11,885	13,775
West Boise	3.45	10.10	16.95	23.65	2,600	10,705	19,175	28,270
TOTAL	13.95	20.40	24.35	32.30	19,500	26,075	31,060	42,045
				Peak Month Average				
Lander Street	13.00	13.35	10.20	13.00	21,640	19,675	15,215	17,635
West Boise	5.40	11.65	20.55	28.95	3,325	13,700	24,545	36,190
TOTAL	18.40	25.00	30.75	41.95	24,965	33,375	39,760	53,825

Notes: MGD = million gallons per day
BOD = biochemical oxygen demand

DATA SOURCE: CH2M Hill 1980c.

Development of Project Alternatives

Initial facility planning for the City of Boise evaluated several treatment process and expansion options at the various city facilities. Identification of alternative projects recognized the following major considerations:

- The Gowen Field treatment plant will remain as is, and continue to serve only the present service area.
- There is limited space available at the Lander Street plant; the actual expansion limitations are governed by the level of treatment required.
- The existing West Boise plant was designed with expansion in mind and a parallel treatment plant could be constructed at the existing plant site to handle higher flows.
- There are certain effluent limitations governed by seasonal flows in the Boise River.

Treatment Plant Expansion and Modification. Alternative treatment plant modifications are dependent on whether or not the capacity of the Lander Street plant is significantly expanded. Expanded capacity at Lander Street would require nitrification of the effluent (bacterial conversion of ammonia to nitrate) or physical/chemical removal of ammonia. The following processes were considered for the Lander Street plant (the first five being biological nitrification processes, the last four being physical/chemical treatments):

- single-stage nitrification
- two-stage nitrification
- activated biofilter tower
- rotating biological contactors
- pure oxygen modifications
- breakpoint chlorination
- ion exchange
- powdered activated carbon
- ammonia stripping towers

With the decision to provide major capacity expansion at the West Boise plant rather than Lander Street, only the minor facility improvements discussed in Chapter 3 are necessary at Lander Street.

The West Boise plant currently provides nitrification using an extended aeration process (single-stage nitrification). Process alternatives considered for the West Boise plant all retained this existing nitrification process. Alternatives considered for West Boise focused on changes to the aeration equipment and changes in the sludge digestion process. The four alternatives investigated at West Boise involved:

- expansion of existing processes
- expansion of the existing processes with conversion to subsurface aeration
- expansion of the existing processes with conversion to anaerobic digestion and addition of grit removal and primary clarification
- expansion of the existing processes with conversion to subsurface aeration and anaerobic digestion, and the addition of grit removal and primary clarification

The recommended project represents a mix of the third and fourth alternatives. The surface aerators at the existing aeration basins would be retained, with subsurface aerators used at the new aeration basins. Expansion would occur in two stages, as discussed in Chapter 3.

Sludge Management. A wide variety of sludge processing, transport, storage, and disposal options were evaluated in the draft facilities plan. Table 4-7 summarizes the sludge processing alternatives evaluated for the West Boise plant. The recommended sludge processing alternative for West Boise involves flotation thickening and anaerobic digestion. No dewatering or drying is recommended because of the selected disposal method (agricultural use, with landfill disposal as a back-up method). Projected sludge volumes for the year 2000 are shown in Table 4-8.

Alternative sludge transport, storage, and use options evaluated in the facility plan are summarized in Table 4-9. The recommended alternative would involve a combination of Alternatives B-2 and B-3. Sludge storage at the prison farm would involve one (or possibly two) 190,000-gallon storage tanks plus a lagoon for emergency storage in the event of storage tank problems (CH2M Hill 1980c).

Interceptor System. Two technical memoranda were prepared by CH2M Hill which dealt with interceptor needs in the Boise area. The two studies include Location Study - North Boise Interceptor Technical Memorandum and the South Boise Interceptor Route Selection Technical Memorandum. The studies focused on three distinct needs: wastewater collection needs in northwest Boise, routing analysis of the South Boise interceptor through Garden City, and an analysis of need for sewer rehabilitation in Garden City and Boise.

North Boise Interceptor. Four alternative interceptor alignment plans were identified in the North Boise Interceptor Technical Memorandum to serve North Boise, an area now served by septic tank-drainfield systems and projected as an area for rapid development (see Figure 4-1). Conclusions of that memo were:

Table 4-7. Sludge Processing Alternatives Evaluated for the West Boise Treatment Plant

	Alternatives Considered for Various Sludge Processing Elements		
Thickening	Stabilization	Dewatering	Drying and Reduction
Gravity thickening (primary sludge)	Anaerobic digestion	Drying beds	Heat drying
Flotation thickening (secondary sludge)	Aerobic digestion	Vacuum filtration	Extractive treatment
Centrifugal thickening (secondary sludge)	Heat treatment	Pressure filtration	Oil emersion Dehydration
		Belt filter press	
	Composting	Centrifugal Dewatering	Incineration
	Chemical Stabilization		Pyrolysis

SOURCE: CH2M Hill 1980c.

Table 4-8. Year 2000 Projections of Digested Sludge Volume from the Lander Street and West Boise Treatment Plants

Treatment Plant	Digested Solids (lb/day) Annual Average	Digested Solids (lb/day) Peak Month	Total Volume (gallons/day) Annual Average	Total Volume (gallons/day) Peak Month	Solids Concentration (% solids) Annual Average	Solids Concentration (% solids) Peak Month
Lander Street	12,240	16,910	62,160	84,895	2.36	2.39
West Boise	21,030	28,630	87,040	116,725	2.90	2.94
TOTAL	33,270	45,540	149,200	201,620	2.67	2.71

SOURCE: CH2M Hill 1980c.

Table 4-9. Sludge Management Alternatives[a]

Alternative	Dewatering	Transport	Storage	Disposal/Use
A	Not included	Tanker truck liquid sludge at 2.3% solids	A1: Covered concrete at each plant site A2: Covered concrete at Prison site A3: Lagoons at Prison site	Agricultural use at Prison site. Assumes big gun sprinkler application
B	Not included	Pipeline pump/stations at 2.3% solids	B1: Covered concrete at each plant site B2: Covered concrete at Prison site B3: Lagoons at Prison site	Agricultural use at Prison site. Assumes big gun Sprinkler application
C	Filter belt press at each plant site. Output at 17.5% solids	Truck dewatered sludge at 17.5% solids	C1: Stockpile C2: No storage C3: Stockpile	C1: Agricultural Use at Prison site via truck spread C2: Landfill C3: Compost
D	Drying beds at each plant site. Output at 50% solids	Truck dewatered sludge at 50% solids	D1: Stockpile D2: No storage	D1: Agricultural use at Prison site via truck spread D2: Landfill
E	Drying beds at Prison site. Output at 50% solids	Pipeline/pump stations at 2.3% solids	E1: Stockpile E2: No storage	E1: Agricultural use at Prison Site via truck spread E2: Landfill

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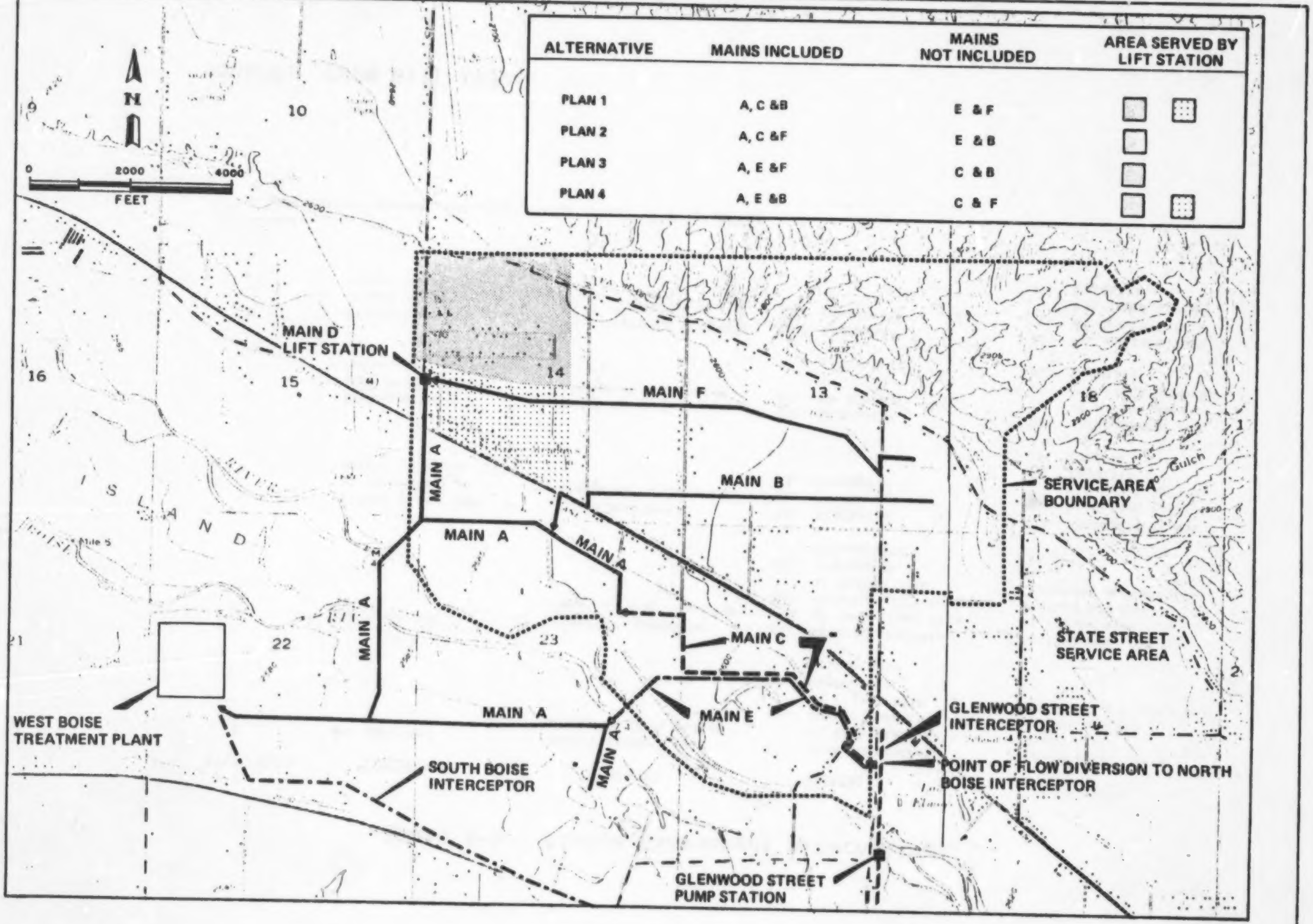
[a] All alternatives assume stabilized sludge source at 2.3% solids.

SOURCE: CH2M Hill 1980c.



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SERVICE AREA
BOUNDARY
STATE STREET
SERVICE AREA
GLENWOOD STREET
INTERCEPTOR
POINT OF FLOW DIVERSION TO NORTH
BOISE INTERCEPTOR
GLENWOOD STREET
PUMP STATION
WEST BOISE
TREATMENT PLANT
SOUTH BOISE
INTERCEPTOR
I S L A N D
RIVER
Gulch
Mile 5

ALTERNATIVE	MAINS INCLUDED	MAINS NOT INCLUDED	AREA SERVED BY LIFT STATION
PLAN 1	A, C &B	E &F	▨ ⬚
PLAN 2	A, C &F	E &B	▨
PLAN 3	A, E &F	C &B	▨
PLAN 4	A, E &B	C & F	▨ ⬚

FIGURE 4-1. NORTH BOISE INTERCEPTOR ALTERNATIVES

- The North Boise interceptor service area would total 2,400 acres and up to 11,000 connections, depending on the alignment plans selected.
- The North Boise interceptor should be sized to handle excess flows of 5.6 MGD from the existing Glenwood pump station.
- Extensive rights-of-way would be required under all alignment plans.
- The location of the floodway boundary of the Boise River affects the choice of an interceptor plan and the area likely to be serviced by the sewer.
- Estimated capital costs appear in Table 4-10.
- Operation and maintenance costs are comparable among alternatives.
- Plan 4 offers the maximum flexibility for staged construction.

As noted in Chapter 3, the North Boise Interceptor is not part of the current grant application for Stage 1 construction.

South Boise Interceptor. The existing South Boise interceptor carries wastewater flows from the Garden City area to the West Boise treatment plant. The proposal is to extend the interceptor Southwest to relieve existing trunk and interceptor lines flowing near capacity. A detailed analysis of the routes and the advantages and disadvantages of each was presented in the South Boise Interceptor Technical Memorandum prepared by CH2M Hill.

The existing interceptor now terminates at the intersection of Field and Bradley Streets. The four alternative routings were evaluated between the terminus at Field Street and Main Street, approximately 11,000 feet to the southeast. Portions of two of those alignments, River North and River West, would be located within or fringing on the floodway of the Boise River. In addition, the South Boise interceptor east of Americana Boulevard would cross the Boise River to join the future Table Rock interceptor. Two alternative routes were evaluated from Main Street to Americana Boulevard, a distance of approximately 4,000 feet (see Chapter 3, Figure 3-5). The recommended routing for Stage 1 construction involves the Inland East-River West alignment.

Flow Augmentation. Under present conditions, flows in the Boise River during the summer months (irrigation season) are sufficient to provide proper dilution of effluent from the Lander Street and West Boise treatment facilities. Winter flows (nonirrigation season), however, are significantly less than summer flows. Reservoir operation studies that may result in greater flow releases from Lucky Peak Reservoir are being developed by the Idaho Department of Water Resources,

Table 4-10. Capital Costs of Alternative Plans - North Boise Interceptor

Plan	Capital Costs	Capital Cost/Acre Served
1	$3,465,000	$599
2	$3,372,000	$583
3	$3,450,000	$574
4	$3,509,000	$584

SOURCE: CH2M Hill 1980c.

U. S. Army Corps of Engineers, and U. S. Bureau of Reclamation. Proposed hydropower facilities in Lucky Peak Dam would also decrease the likelihood of low flow situations.

The U. S. Fish and Wildlife Service has recommended stream resource maintenance flows (SRMF) of 225 cfs in October and November and 150 cfs during January through March. A 1-in-10-year low river flow of 80 cfs was used by the Idaho Department of Health and Welfare to determine treatment plant effluent limitations at the West Boise and Lander Street plants. Table 4-11 shows the percent of time that the Lander Street and West Boise plants would have ammonia limitations.

Energy Requirements

Treatment Plant Expansion and Modification. In the Boise facilities plan, CH2M Hill explored six options and several suboptions for the utilization of methane (digester) gas at the Lander Street treatment plant. Primary use of the gas would be to operate raw sewage pumps and air blowers; however, two options for generating electricity for sell-back to the Idaho Power Company (IPCo) were also evaluated. Digester gas generation would vary from approximately 90,000 cubic feet per day during the winter to 140,000 cubic feet per day during the summer. The quantity of natural gas or electrical power needed to supplement the use of digester gas at the facilities would vary with the option. The total average energy cost would depend on: (1) the equipment needed, (2) whether natural gas or electricity was used to supplement digester gas and the future projected cost of each, and (3) the credit price allowed for electrical energy generated and fed back to IPCo. CH2M Hill recommended that the City of Boise choose the preferred option after negotiations for sale of generated electricity to IPCo are finalized.

Energy requirements for the various modification alternatives at the West Boise plant are presented in Table 4-12. The alternative of converting to anaerobic sludge digestion was determined to be the most cost-efficient of the three alternatives (CH2M Hill 1980c).

Sludge Management. An energy use comparison of the various sludge transport alternatives is presented in Table 4-13. The liquid sludge pipeline transport alternative was determined to require the least amount of energy. In addition to sludge transport, approximately 5,700 gallons of diesel fuel and 52,200 kilowatt hours of electricity would be required per year to apply sludge to agricultural land (CH2M Hill 1980).

Table 4-11. Ammonia Limitations

Treatment Plant	Percent of Time Ammonia Discharge is Limited			
	Fall	Winter	Spring	Summer
Lander Street	15	0	0	0
West Boise*	100	75	25	75

*Limitations are based on projected year 2000 wastewater flows at West Boise.

SOURCE: CH2M Hill 1980c.

Table 4-12. Process Energy Consumption for West Boise Alternatives

	ENERGY REQUIREMENTS (horsepower)[a]					
	Alternative No. 1		Alternative No. 2		Alternative No. 3	
	Aerobic Digestion		Anaerobic Digestion		Aerobic Digestion With Primary Clarification and Flotation Thickening	
	1990	2000	1990	2000	1990	2000
Effluent Pumping	180	290	180	290	180	290
Grit Removal	--	--	7	14	--	--
Screening and Grinding	4	8	4	8	4	8
Primary Clarification	--	--	4	8	4	8
Aeration Basins	670	1,140	520	890	520	890
Secondary Clarification	8	16	8	14	8	14
Postaeration	50	80	50	80	50	80
Cavity Thickening	--	--	1	1	--	--
Flotation Thickening	--	--	55	55	55	55
Sludge Pumping	75	120	65	115	70	115
Aerobic Digestion	430	850	--	--	450	750
Anaerobic Digestion	--	--	100[b]	145[b]	--	--
Total Energy Required (hp)	1,417	2,504	994	1,620	1,341	2,210
Digester Gas Heating Value (therms/year)	0	0	202,000	370,000	0	0
Digester Heating Requirements (therms/year)	0	0	95,000	139,000	0	0
Electrical Energy Generation (hp)[c]	0	0	195	360	0	0
Net Electrical Energy Required						
o Horsepower	1,417	2,504	799	1,260	1,341	2,210
o Kilowatt-hours/MGD	1,691	1,830	953	920	1,601	1,615

[a] Based on average annual flow rates of 15.0 MGD in 1990 and 24.5 MGD in 2000.

[b] Excludes digester sludge heating requirements.

[c] Based on the following assumptions:
Gas engine availability = 85 percent.
Engine generator efficiency = 25 percent.
Gas engine heat recovery efficiency = 50 percent.
Boiler efficiency = 80 percent.

SOURCE: CH2M Hill October 1980c.

Table 4-13. Energy Consumption for Sludge Transportation Alternatives[a]

Item	Liquid Sludge Pipeline Transport	Liquid Sludge Truck Transport	Dewatered Sludge Truck Transport	Liquid Sludge Pipeline/Truck Transport
Electrical Energy (kWh/yr)	330,300	--	1,143,000	219,900
Diesel Fuel (gal/yr)	--	42,000	6,480	15,050
Total Annual Cost ($/yr)[b]	8,000	48,000	35,000	22,900

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[a] Electrical energy and diesel fuel quantities are based on average annual quantities in the year 1990.

[b] Annual costs are in December 1980 dollars: Electrical energy cost = $0.01915/kWh + $2.60/kW-month demand. Diesel fuel cost = $1.15/gal.

SOURCE: CH2M Hill October 1980c.

No-Action Alternative

The no-action alternative would involve the continued operation of the Lander Street and West Boise treatment plants at their present capacities. The Lander Street plant would, in the near future, become overloaded from both a hydraulic and a waste load standpoint. The West Boise plant is presently overloaded from a hydraulic standpoint. Increased overloading would result in reduced effluent quality and increased water quality impacts on the Boise River. Such problems could lead to restrictions on future connections to these systems or locally funded facility modifications and expansions.

Eagle Sewer District Facilities

The existing Eagle sewage wastewater plant is considered to be an interim treatment facility. A capacity limit equivalent to 790 dwelling units (population of 2,370) has been imposed by the Idaho Department of Health and Welfare. With the understanding that future facilities would be needed, the Eagle Sewer District (ESD) purchased a 65-acre site approximately 1 mile downstream from the existing facilities.

J-U-B Engineers, Inc., prepared a facilities plan for the ESD which presented regionalization, land application, and on-site disposal options. Facility site alternatives were not considered in the draft facility plan. The existing and proposed facility sites were shown in Chapter 3 (Figure 3-6).

The proposed facility site is shown as being within a "special flood hazard area" on the 1977 flood hazard boundary map produced by the Federal Insurance Administration.

The U. S. Army Corps of Engineers has completed a ground control survey and is currently developing new cross sections in the area which will aid in the development of detailed floodplain boundaries (Fintel pers. comm.). A request has been submitted to the District Engineer in Walla Walla, Washington for floodplain information as soon as it is available. No information had been received at the time this Final EIS was prepared.

Wastewater flow projections used for initial facility planning are shown in Table 4-14. Refined flow and waste load projections will be developed during more detailed design studies.

Table 4-14. Sewage Flow Projections for the Eagle Sewer District

Year	Area Population	Service* Population	Population Increase	Change In Flow	60 gal/cap/day Base Flow	Existing Removable I/I Infiltration	Existing Non-Removable I/I Infiltration	Change In Allowable I/I	250 gal/hc/day Allowable I/I	Flow Less Removable I/I	Total Flow
1979	4581	2370	--	--	0.1415	0.155	0.0535	--	0.0535	0.1950	0.35
1985	6210	4552	2182	0.1309	0.2724	0.155	0.0535	0.0606	0.1141	0.3865	0.5415
1990	8002	6897	2345	0.1407	0.4131	0.155	0.0535	0.0651	0.1792	0.5923	0.7473
1995	10,311	9759	2862	0.1717	0.5848	0.155	0.0535	0.0795	0.2587	0.8435	0.9985
2000	13,286	13,286	3527	0.2117	0.7965	0.155	0.0535	0.0980	0.3567	1.1532	1.3082

*It is assumed that the present population in the service area not sewered, will be sewered at a rate of 5% per year or 110 persons per year.

SOURCE: J-U-B Engineers 1980

Treatment Alternatives

Five project alternatives were analyzed by J-U-B Engineers. These are summarized below.

Alternative A - Oxidation Ditch. This alternative would consist of pumping, pretreatment, oxidation ditch with rotating aerators, secondary clarifiers, disinfection and sludge handling facilities located at the new 65-acre site owned by ESD. Construction of the facility would be staged according to population growth.

Effluent from the disinfection facility (chlorine contact chamber) would be discharged through a diffuser into the North Channel of the Boise River. Sludge from the clarifiers would be held in an equalization basin until applied to land by injector truck. The sludge disposal site has not yet been determined.

Alternative B - Pump to West Boise Treatment Plant. This alternative would require pretreatment (screening grit removal and flow measurement), a pumping station and 19,000 feet of pressurized pipeline from the new treatment plant site to the West Boise treatment plant. The pipeline would require two river crossings.

Alternative C - Land Application by Irrigation. The alternative of applying wastewater by slow rate disposal method would have the following project components: pretreatment (screening); pumping station; aerated lagoons; 45 acres of storage lagoons (for storage of approximately 125 days of wastewater flows); disinfection; application system; and 250-325 acres of land.

Alternative D - Rapid Infiltration. Rapid infiltration was the second land disposal option evaluated. The components of the alternative would include pretreatment, a lift station, aerated lagoon, equalization lagoons, pump stations and rapid infiltration basins. Observation wells would be constructed to monitor groundwater quality.

Alternative E - On-Site Disposal. This alternative would represent a combination of on-site community septic systems and construction of a new 0.55 MGD treatment plant to treat sewage from presently sewered areas (J-U-B Engineers 1980).

Ada County presently requires a 1-acre minimum lot size for an on-site disposal system and a well. If central water is provided, the minimum lot size required is .5 acre. Within the planning area, approximately 400 homes are presently being served by individual on-site systems and another 500 units would likely be developed utilizing subsurface disposal. Since the existing sewage treatment facilities are "at capacity" (equivalent of 790 dwelling units), any future on-site systems or a community septic system.

The community septic system would allow connection of a maximum of 70 dwelling units to a compartmentalized septic tank and parallel drainfield. Septic tanks would be pumped once every 2 years and septage disposed of at the new ESD treatment facility.

Interceptor Systems

The proposed interceptor (Figure 3-6) would be common to all alternatives except no-action and Alternative E (on-site disposal). Sizing of the interceptor will depend on whether it is designed for a 20-year flow projection or (as recommended in the facility plan) a 40- to 50-year planning period.

Energy Requirements

Energy requirements for the four centralized treatment alternatives are shown in Table 4-15. The recommended project (rapid infiltration) has the lowest primary energy requirement. The oxidation ditch alternative (recommended if the rapid infiltration site proves unusable) has a primary energy requirement close to that of the proposed project.

Project Costs

Estimated project costs and user charges are summarized in Table 4-16. The proposed project (rapid infiltration) is the least costly alternative.

No-Action Alternative

The no-action alternative would be represented by the continued operation of the present treatment system. The sand filter treatment is operating within secondary treatment standards and would probably continue to do so under present loading levels (population equivalent of 2,370). While no additional hookups to the sewer system would occur, some residential development would occur utilizing individual subsurface disposal systems.

Southwest Community Wastewater Management Study

Rapid population growth in the Southwest community during the period from 1970-1978 resulted in a number of steps designed to provide orderly future development of the area:

Table 4-15. Primary Energy Consumption for Alternative Eagle Sewer District Projects

	Project Alternatives				
Energy Units	Oxidation Ditch	Pump to West Boise	Agricultural Irrigation	Rapid Infiltration	On-Site Systems
Horsepower[1]	90	77*	121	85	70
Kilowatt hours/day[2]	1,611	1,379*	2,166	1,522	1,253
Kilowatt hours/MGD[2]	1,230	1,052*	1,654	1,162	2,279

Notes:

[1] From J-U-B Engineers 1980.

[2] Jones & Stokes Associates calculation of energy equivalencies; 1.31 MGD assumed for all but the on-site systems alternative (0.55 MGD).

*Does not include energy requirements at the West Boise treatment plant (an additional 67 horsepower = 1,617 kilowatt hours/day = 1,234 kilowatt hours/MGD based on data in Table 4-12).

Installed horsepower and equivalent kilowatt hours may be somewhat in excess of actual facility energy demand due to standardized sizing of electric motors.

Table 4-16. Estimated Project Costs and Monthly User Charges for Alternative Eagle Sewer District Projects

	Project Alternative				
Cost Element	Oxidation Ditch	Pump to West Boise	Agricultural Irrigation*	Rapid Infiltration	On-Site Systems
Capital Cost	$2,849,000	$2,683,000	$2,797,000	$2,402,000	$3,584,000
Annual O&M Cost	62,000	98,000	71,000	63,000	58,000
Total Annual Cost	334,000	354,000	338,000	291,000	-
Monthly User Charge[1]	$7.43	$10.30	$8.14	$7.16	$7.68

Notes:

*Cost of effluent pipeline system not included.

[1] Based on 1,000 connections; interceptor cost will add $0.49 to the monthly user charge.

SOURCE: J-U-B Engineers 1980.

- 1978 - Board of Ada County Commissioners passed a moratorium on additional platting and residential rezoning in the Southwest community.
- February 1979 - The County Commissioners adopted the Southwest Interim Development District Ordinance to guide development until revision of the comprehensive plan.
- 1979 - The Ada Planning Association (APA) initiated preparation of the Southwest Community Wastewater Management Plan.

During early APA planning efforts, 39 wastewater treatment and disposal alternatives were evaluated and reduced to 10 warranting further consideration. Based on public input and decisions regarding development density, the 10 alternatives were narrowed to three structural alternatives and the no-action option. Those alternatives were:

- Central wastewater collection system and treatment at the West Boise treatment plant.
- Central wastewater collection and treatment at a Southwest community wastewater treatment plant with land disposal of effluent.
- Wastewater collection and treatment at community lagoons with land disposal of effluent at separate sites or a common site.
- On-site systems.

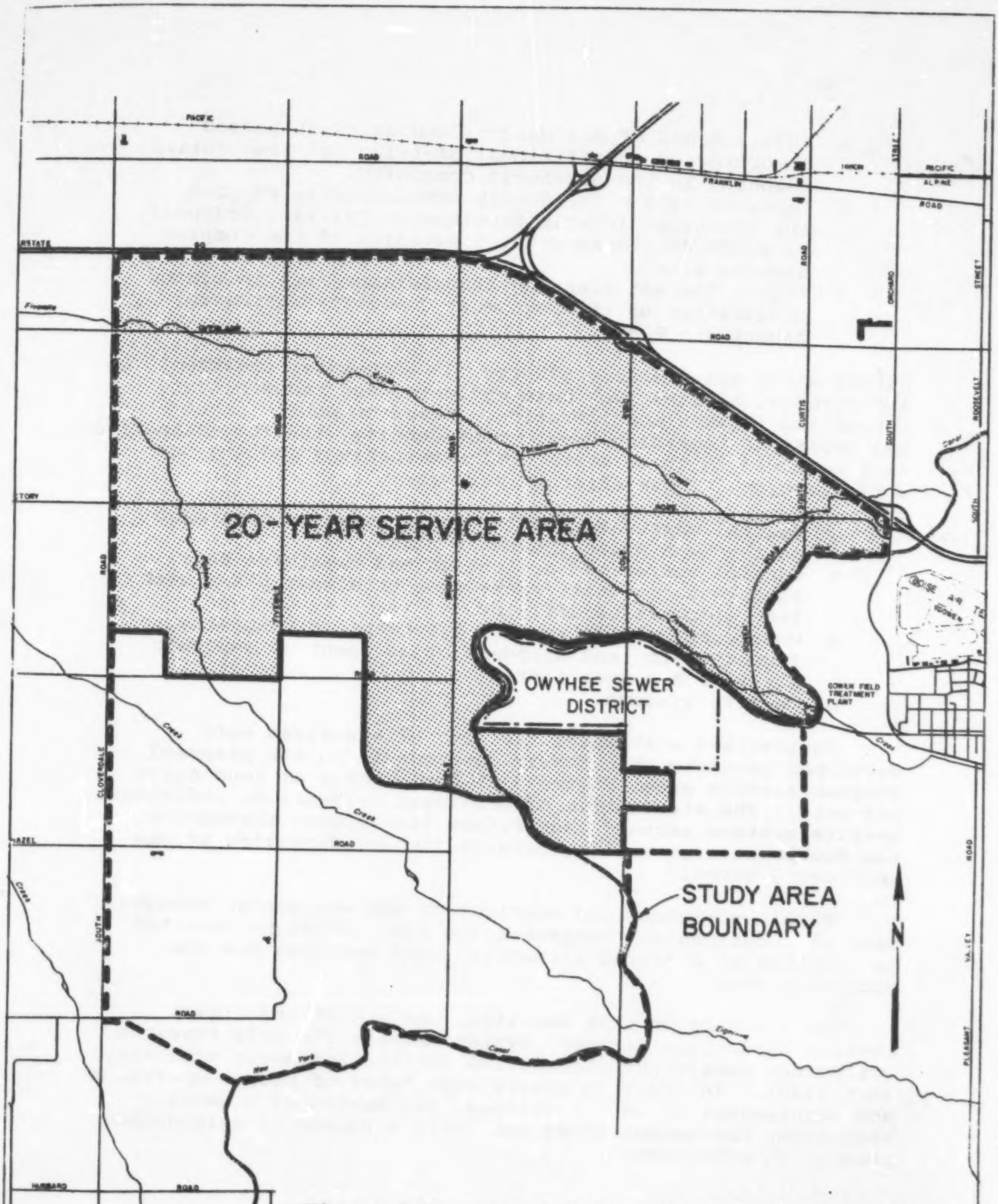
Centralized wastewater facility alternatives were developed assuming that future development in the proposed 20-year service area (Figure 4-2) would occur at four units per acre. The alternative of continued reliance on individual on-site systems assumed that future development throughout the Southwest area would generally involve densities of one unit per 5 acres.

Public workshops and hearings on the wastewater management alternatives and comprehensive plan revisions resulted in adoption of a "rural lifestyle" land use plan for the Southwest area.

As a result of that decision, the use of individual on-site subsurface disposal systems became the only feasible wastewater management alternative for the Southwest community (APA 1980). In order to ensure some level of proper operation and maintenance of septic systems, the Southwest Community Wastewater Management Study set forth a number of maintenance program alternatives.

Operations and Maintenance Program Alternatives

Three broad programs and a number of options within each were analyzed. As discussed in Chapter 3, the voluntary operation and maintenance program was adopted as a countywide program.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ORCHARD
STREET
ROAD
INTERSTATE 80
ROAD
CURTIS
SOUTH
ROOSEVELT
Creek
20-YEAR SERVICE AREA
BOISE AIR TERMINAL
GOWEN FIELD TREATMENT PLANT
OWYHEE SEWER DISTRICT
CLOVERDALE
ROAD
HAZEL
ROAD
STUDY AREA BOUNDARY
N
VALLEY
ROAD
PLEASANT
New York Canal
HUBBARD
ROAD

Figure 4-2. Area Considered for Centralized Sewer Service During Southwest Community Wastewater Management Study.

SOURCE: APA 1980b.

Mandatory Operation and Maintenance Program.

Case I. With this alternative an advisory agency would be given authority to issue renewable use permits for subsurface systems. Inspection would be conducted every 3 years and any needed repairs made by the homeowner. A permit fee would be levied to finance operational costs of the program. Licensed contractors would do the inspection, repairs and any necessary pumping.

Case II. The Case II mandatory operation and maintenance program would include all inspection maintenance and repairs conducted by the public agency, with homeowners charged an annual fee plus costs of system repairs. Easements through private property would be necessary for maintenance and repair.

Case III. The Case III option would involve ownership, maintenance, and repair of septic systems. An annual fee would be levied to finance inspection and repair, with all users charged the same fee, no matter what the needed repair and maintenance.

Volunteer/Mandatory Operation and Maintenance Program. This combination program would involve a volunteer or optional mandatory program for all homeowners now on septic systems, with mandatory participation by homeowners with failing septic systems, and those constructing homes after implementation of the maintenance program.

Volunteer Operation and Maintenance Program. The volunteer program would include the establishment of a public education program and the mailing of notices to remind homeowners to inspect their systems.

No-Action Program. The no-action alternative would represent a continuation of the present system of allowing all maintenance to be the responsibility of homeowners.

Chapter 5

POPULATION PROJECTIONS AND GROWTH INDUCEMENT

Introduction

Population projections prepared in conjunction with wastewater facility planning are used to determine projected wastewater flows. The projected flows provide the basis for the sizing of wastewater treatment facilities. In addition, population projections are used in environmental impact assessments to assess potential indirect impacts of growth accommodated by wastewater plans and to develop possible mitigation measures.

EPA's policy for population projections to be used for facilities planning is presented in Appendix A of the agency's cost-effectiveness analysis guidelines (U. S. EPA 1978a). The policy requires wastewater facilities plans to use population projections developed by states or appearing in approved 208 plans, provided that state projections do not exceed Bureau of Economic Analysis (BEA) projections by more than 5 percent, and that 208 plan projections do not exceed state projections by more than 10 percent. New BEA projections are currently being developed in conjunction with the federal Office of Management and Budget (OMB). These new projections are not expected to be completed until late 1981.

The state baseline population projection for facilities planning was developed by the Bureau of Water Quality (BWQ) and approved by EPA in January 1980. The BWQ projection for Ada County in the year 2000 was 268,622. This projection was subsequently revised to 289,000, and approved by EPA in March 1980.

In August 1978, Ada Planning Association (APA) adopted the report Demographic and Employment Distribution (DED) to Year 2000. This report presents population and employment allocations in 5-year intervals for Ada County and for smaller statistical areas. The DED allocations were adopted as the population baseline for all APA regional planning programs, including 208 areawide waste treatment management planning. A summary of the DED population allocations is presented in Table 5-1.

Table 5-1. Summary of DED Planning Area Population Projections

	1975	Additional	2000	Year 2000 (% of Total)
Southeast	11,425	42,100	53,525	18.5
North River	35,650	34,300	69,950	24.2
City Center	2,940	3,715	6,655	2.3
North End	17,180	930	18,110	6.3
Northwest	5,310	19,145	24,455	8.5
Foothills	6,725	8,431	15,156	5.2
Warm Springs	3,495	2,079	5,574	1.9
West Bench*	28,700	16,415	45,115	15.6
Central Bench	36,105	7,250	43,355	15.0
[a]Southwest	9,080	13,300 (9,905)	22,380 (18,985)	7.7 (6.6)
Total Metro	120,960	113,365 (109,970)	234,325 (230,930)	81.1 (79.9)
Meridian	6,349	18,801	25,150	8.7
[a]Eagle	2,720	7,505 (10,566)	10,225 (13,286)	3.5 (4.6)
Kuna	1,308	5,517	6,825	2.4
[a]Rural Area**	8,063	4,412 (4,746)	12,475 (12,809)	4.3 (4.4)
Total Nonmetro	18,440	36,235 (39,630)	54,675 (58,070)	18.9 (20.1)
Total Ada County	139,400	149,600	289,000	100.0

* Includes Garden City
**Includes Star

SOURCE: Ada Planning Association, 1978. Demographic and Employment Distribution to the Year 2000: Ada County, Idaho.

[a] Numbers shown in parentheses reflect APA reallocation of 3,395 from the Southwest Area to the Eagle service and rural areas.

Description of Facility Planning Population Projections

Boise Planning Area

The Boise planning area corresponds to the Boise Metropolitan Area with the exception of the Southwest area (see Figure 4-6). The population projections prepared by the facilities plan consultants were based on the DED allocations. The population projection in the Boise facilities plan for year 2000 is 212,145 (Table 4-4). This compares with 211,945 in the DED study for the year 2000.

Southwest Planning Area

A comprehensive land use plan was adopted for the Southwest planning area in August 1980. This land use plan, referred to as Plan "C" - rural lifestyle, allows a maximum density allowance of one unit per 5 acres for all new development in areas designated "rural residential". Based on the adopted land use plan, the population allocated by APA for the year 2000 is 18,985.

As shown in Table 5-1, the adopted 208 (DED) allocation for the Southwest area in the year 2000 is 22,380. The difference between the DED distribution and the most recent APA projection is 3,395 persons. Most of this additional population allocated to the Southwest planning area has been re-allocated by APA to the Eagle sewer service area (Area B in Figure 3-6) for 20-year projections of wastewater treatment capacity (Minter pers. comm.).

Eagle Planning Area

The DED original allocation for Eagle in the year 2000 was 10,225. Although this projection had been adopted as the official 208 plan projection, APA has acknowledged that it is probably low (Minter pers. comm.). With the addition of 3,061 persons formerly allocated to the Southwest area, the revised APA allocation for the Eagle planning area is 13,286. The population projection in the Eagle facilities plan is 13,286 for the year 2000 and corresponds with APA's revised allocation for Eagle. This projection covers only Eagle planning area B. Provision of sewer service to planning area C would need approval of residential zoning by Ada County (Figure 3-6).

Growth Inducement Role of the Proposed Projects

EPA policy requires that environmental impact statements on wastewater treatment projects receiving federal construction grant funds consider the growth-related impacts of the projects. These impacts are typically indirect impacts because they are primarily caused by the growth in part accommodated by expansion of wastewater treatment facilities. The growth-related impacts are discussed in Chapters 6 through 12. The following section examines the relationship between sewer facilities and growth; assesses growth under the no-action alternative; and discusses the growth accommodated by the proposed projects.

Relationship of Sewer Facilities to Growth

Although many factors contribute to the growth of an area, the availability of sewer facilities can be and often is an important influence on the rate of growth. Extension of sewer facilities to a previously unserviced area may induce or accelerate growth. Conversely, failure to provide facilities may limit or restrict growth. The extension of sewers is important not only in terms of servicing areas but also in planning for future development of areas. Providing sewer facilities to an area prematurely can subvert local land use planning efforts.

The important relationship between sewer availability and growth has been formally recognized in local land use plans, policies and ordinances in Ada County. Both the City of Boise and Ada County have adopted sewer wetline policies which restrict growth to areas where sewer service is available. In addition, the City of Boise has encouraged development in the Southeast area through increased city participation in funding for local collection systems. These sewer policies are effective tools in accomplishing related land use objectives.

Growth Under the No-Action Alternative

This section examines growth that would occur in the area if the project were not built. It is not possible to estimate exactly the extent of growth attributable to the proposed projects. However, some generalizations can be drawn. Without this project, the level of growth in the Boise planning area would not reach projected levels. This is primarily due to the development restrictions of the existing sewer wetline ordinance. Boise is the economic center of the region. The significant decrease in the current allocation to the Boise area that would result from the No-Action alternative would likely cause growth in other local areas to exceed what is currently projected. However, it is very unlikely that other urban areas in the region could attract or accommodate all the growth presently allocated to Boise. Therefore, it is expected that the overall regional growth would decline.

The impact of the No-Action alternative on growth in Eagle is less certain. Eagle probably would absorb some of the regional population growth, but it would be at lower densities than projected with expanded wastewater facilities.

Growth Accommodated by the Proposed Projects

Boise Planning Area. Expansion of wastewater treatment facilities in the Boise planning area would accommodate a population increase to 212,145 by the year 2000. This represents an increase of 86,335 persons over the 1978 estimate of 125,810 projected to occur over the 22-year period (1978-2000). There are currently 29,360 Boise area residents who are not on sewers. The planned expansion of wastewater facilities will provide capacity to sewer these residents and all projected new population by the year 2000.

Wastewater facilities planning for Boise stages implementation of the project. Stage 1 includes minor modifications at the Lander Street treatment plant to meet effluent discharge requirements. The present capacity of the Lander Street plant is 15 MGD and no additional hydraulic capacity is planned. Diversion of some of the existing flow at the Lander Street plant to the West Boise plant will provide capacity at Lander Street for some future growth. Based on projected flows, capacity at the Lander Street plant will be reached sometime after the year 2000.

In addition to the Lander Street modifications, Stage 1 includes expansion of the West Boise treatment plant from the current peak capacity of 6.3 MGD to 17 MGD. Based on projected flows, the West Boise treatment plant will reach its Stage 1 capacity of 17 MGD about 1987 and will provide service to approximately 94,657 residents (extrapolated from Table 4-4).

Stage 2 involves construction of an additional 17 MGD capacity treatment plant adjacent to the existing West Boise treatment facilities. This expansion should have sufficient capacity to serve the 212,145 population projected for the year 2000 as well as needs beyond year 2000. Total capacity of the West Boise and Lander Street treatment plants will be 49 MGD by the year 2000.

Eagle Planning Area. Expansion of wastewater facilities in the Eagle planning area would accommodate a population increase from over 4,581 persons (estimated in 1979) to 13,286 in the year 2000 (Table 4-16). This represents an increase of 8,705 persons over the 21-year period. In addition, an estimated 1,550 persons could be served if residential zoning is approved by Ada County for planning area C (Figure 3-6). This additional population is not included, however, in the current grant application.

Facilities planning in Eagle involves two 10-year stages for design of treatment facilities. It is estimated by the facility planning consultants (J-U-B Engineers 1980) that, as of 1979, 2,370 persons out of a total population of 4,581 in planning area B were provided sewer service. By 1990, it is projected by J-U-B that 8,002 persons will reside in planning Area B, with 6,897 persons on sewers (Table 4-16). This represents an increase in sewered population of 4,527 persons during the initial 10-year planning period. By the year 2000, it is projected by J-U-B that the total projected population (13,286) within the Eagle planning area would be provided sewer service.

It appears there is some inconsistency between the projected population to be serviced (13,286) by the year 2000 and the density of development in the Eagle planning area slated for sewering. It is recognized by J-U-B Engineers that not all areas will be of sufficient density in the year 2000 to warrant sewer service. However, the total population projected for the year 2000 has been used to estimate flows and includes extending sewer service to the total planning area.

Chapter 6

LAND USE IMPACTS

Introduction

A rapid increase in population is expected in Ada County over the next 20 years. As a result, significant land use changes are likely to occur. Although comprehensive plans have been prepared to provide quidance for directing this growth, the effectiveness of local plans to guide growth will be determined by the extent to which the plans are implemented. An important issue in this EIS is the impact which implementation of the wastewater facility plans will have on influencing future land use conditions.

This chapter examines the existing land use in the three planning areas; reviews local land use plans and development policies; and assesses the consistency of the wastewater facility plans with local land use plans.

Existing Land Use

Information on existing land use conditions in the three planning areas is limited. In the Boise planning area, the most comprehensive analysis of existing land use was prepared in 1970 by the Ada Council of Governments (ACOG) (Johnson pers. comm.). For the Southwest planning area, more recent information is available as a result of the current wastewater and comprehensive land use planning efforts. For the Eagle planning area, limited land use information is available from the preparation in 1977 of the Eagle Comprehensive Plan.

Boise Planning Area

The existing land use pattern in the Boise planning area is characterized by relatively dense concentration of commercial and residential uses in the central region changing to more scattered developments in the outlying areas.

For planning purposes, the Boise metropolitan area is divided into five major planning subareas (Figure 6-1). These planning subareas are the Southeast area; the North River area; the West Bench area; the Central Bench area; and the Southwest area.

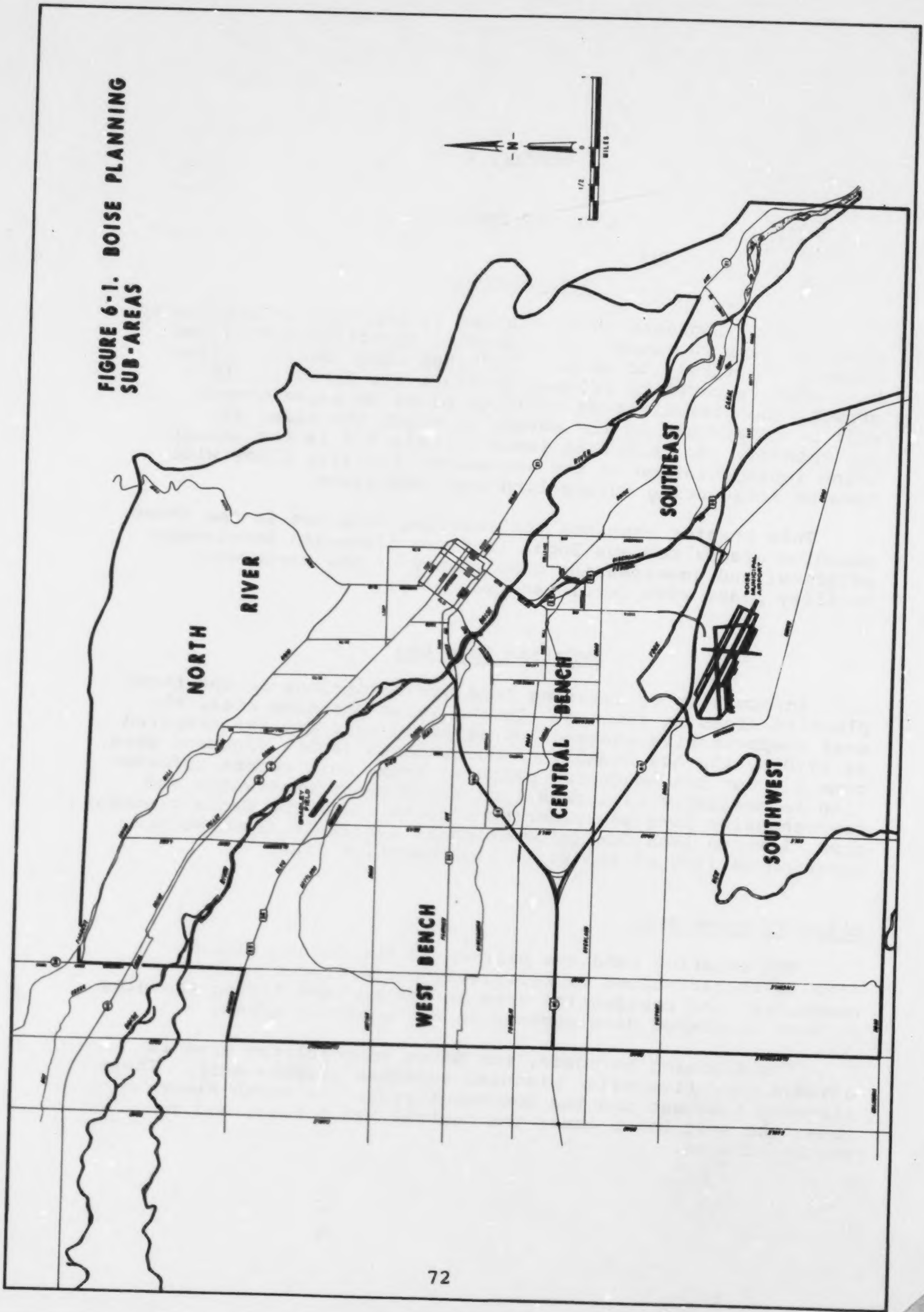

NORTH RIVER
CENTRAL BENCH
WEST BENCH
SOUTHEAST
SOUTHWEST
BOISE MUNICIPAL AIRPORT
N
1
1/2
0
MILES

FIGURE 6-1. BOISE PLANNING SUB-AREAS

As shown in Table 6-1, the Boise planning area had a slightly higher percentage of vacant acres (53%) than developed acres (47%) in 1978. The Central Bench area was the most developed (83%) and the Southeast area was the least developed (22%). Although 53% pf the Boise planning area consisted of vacant land, only 84% of this vacant land was considered developable.

Southwest Planning Area

The existing land use in the Southwest planning area consists primarily of a mixture of residential, suburban and agricultural uses. Approximately 42 percent of the 10,506 total gross acres has been subdivided for residential use at an average gross density of 1.19 dwelling units per acre (APA 1979a). Fifty-two percent of the Southwest planning area is used for agricultural/grazing purposes or is undeveloped. Industrial development in the Southwest planning area is located primarily in the Boise airport influence area at the eastern extreme of the area. Major commercial uses include a community shopping center at Overland Road and Five-Mile Road, a neighborhood shopping center at Five-Mile Road and Lake Hazel Road, and a mixture of commercial and industrial uses at the Interstate 80/Overland Road interchange.

Eagle Planning Area

Much of the Eagle planning area is sparsely populated, consisting of farmland, undeveloped open space, and floodplain. Urban land uses are centered around the City of Eagle, with agricultural, rural residential and undeveloped open space accounting for the bulk of the land uses in the planning area. Table 6-2 presents a summary of land use in the Eagle area as of 1977.

The existing residential development pattern consists of 3-4 lots-per-acre subdivisions in the city and large lot (1-5 acres) subdivisions in the rural areas. The commercial and industrial uses are located in the immediate vicinity of Eagle.

Land Use Plans and Policies

The Idaho Local Planning Act of 1975 establishes the framework for local government comprehensive planning. The law requires all cities and counties to prepare general plans, requires certain elements to be included in local plans, and requires zoning to be consistent with local plans. The Idaho Local Planning Act also requires that local plans designate "areas of city impact". The "areas of city impact" are to be negotiated between the county and the incorporated cities. The purpose in defining "areas of city impact" is to identify areas surrounding the cities where land use and other policies are important for successful implementation of

Table 6-1. Allocation of Developed Acres, Vacant Acres and Developable Acres by Boise Planning Subareas

	Total Acres	Developed Acres	Developed Acres as % of Total Acres	Vacant Acres	Vacant Acres as % of Total Acres	Developable Acres	Developable Acres as % of Total Vacant Acres
Southeast Planning Subarea	8,494	1,852	22	6,642	78	4,262	64
North River Planning Subarea	18,675	7,974	43	10,701	57	9,591	90
West Bench Planning Subarea	11,182	6,051	54	5,131	46	4,934	96
Central Bench Planning Subarea	6,198	5,136	83	1,062	17	986	93
Totals - all Planning Subareas	44,549	21,013	47	23,536	53	19,773	84

SOURCE: Derived from APA "Demographic and Employment Distribution to the Year 2000" 1978.

Table 6-2. Land Use in the Eagle's Area of City Impact in 1977

		Acres		Lots/Units
Residential		(1,877.3)		(720)
Less than 10,000 square feet	15		77	
More than 10,000 square feet	741.2		472	
Five acres or more	797.5		115	
Multifamily	11.6		56	
Rural housing	312.0			
Commercial		116.4		
Industrial		112.7		
Public/Government		74.9		
Institutional/School		20.7		
Open Space/Parks		68		
Vacant		(13,811.0)		
More than 10,000 square feet	526.2			
Five acres or more	616.5			
Agriculture	12,668.3			
TOTAL		16,081.0		

SOURCE: Eagle Planning and Zoning Commission 1979.

both county and city goals (Ada County Planning Commission 1977). Figure 6-2 presents adopted and proposed "area of city impact" designations in northern Ada County.

Ada County

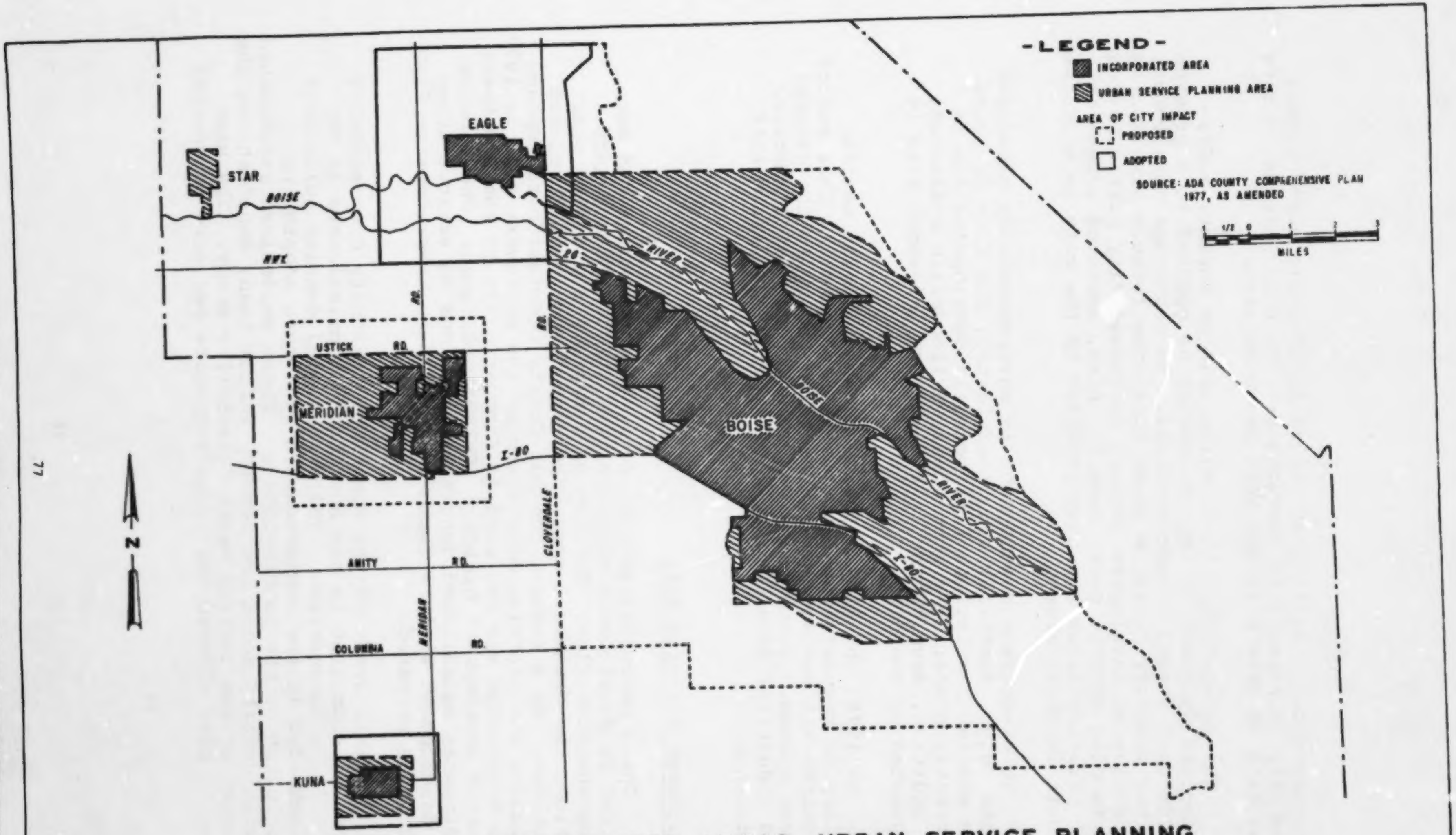
In compliance with the Idaho Local Planning Act, Ada County adopted a comprehensive plan in June 1977. This plan uses the "urban service planning area" (USPA) approach to encourage future growth in urban areas. The USPA is defined as the area which each city intends to provide with sewer and other "urban-type" services. A development objective in Ada County's Comprehensive Plan is to accommodate between 92 and 95 percent of new growth within USPAs. The USPAs within the study area are identified in Figure 6-2. As shown in Figure 6-2, the USPA is generally smaller than the area of city impact.

In unincorporated Ada County, the county has implemented the urban service planning area concept by adoption of a "planned development" ordinance. This ordinance requires that all proposed residential developments in the county have central water and sewer service before a building permit is issued. Because the county's policy over the past four years has been to approve only subdivisions within USPAs, the "planned development" review process has been used effectively to require residential development to locate within the USPAs.

Boise Planning Area

In October 1978 the Boise City Council adopted a Policy Plan for the Boise Metropolitan Area. This plan shows the Southwest area as part of the Boise Area of City Impact and it suggests a population goal for the area. However, a separate Southwest Community Comprehensive Plan has been adopted by Ada County. Garden City, which is part of the metropolitan area, is excluded from the Boise Policy Plan because it has its own comprehensive plan.

In projecting a development pattern for the Boise Metropolitan Area, the Boise Policy Plan's steering committee suggested a development theme of centrality and compactness. The central city area is to serve as the major employment center for the area. Population growth is encouraged to locate in the Southeast and Northwest subareas. Improved access from these areas to the central city area is also


-LEGEND-
INCORPORATED AREA
URBAN SERVICE PLANNING AREA
AREA OF CITY IMPACT
PROPOSED
ADOPTED
1/2 0 1 2 3
MILES
STAR
BOISE
EAGLE
HWY.
RD.
RIVER
20
USTICK RD.
MERIDIAN
BOISE
I-80
CLOVERDALE
AMITY RD.
MERIDIAN
COLUMBIA RD.
KUNA
N

SOURCE: ADA COUNTY COMPREHENSIVE PLAN 1977, AS AMENDED

FIGURE 6-2. INCORPORATED AREAS, URBAN SERVICE PLANNING AREAS & "AREAS OF CITY IMPACT" IN NORTHERN ADA COUNTY

recommended. Infilling of vacant developable acres within the city is especially encouraged. The city intends to slow the rate of growth in the West Bench subarea.

The Boise Policy Plan relies upon an incentive/disincentive approach to implementation as opposed to a program based upon strong growth controls. To encourage development in the priority areas, a sewer financing formula provides an incentive to developers through increased city participation in funding (Stacy, pers. comm.). Also, improved access in the priority areas has been provided by the city to stimulate growth in those areas.

To discourage development in environmentally sensitive areas (e.g., foothills and floodplains), the City of Boise has enacted regulations for foothills development and is currently preparing a comprehensive floodplain ordinance. In addition, development in the airport influence area is regulated by the city.

In 1978, the City of Boise adopted a sewer wetline policy to regulate the location of development. This policy requires all new development to be hooked up to the central sewer system. Since adoption, however, several commercial and industrial developments have been exempted from this ordinance.

Southwest Planning Area

Until recently, growth in the Southwest area had been guided by development policies from the 1968 Ada County Comprehensive Plan. Because of a rapidly increasing population, the Southwest area experienced some growth-related problems. As a result, the Ada County Commissioners imposed a zoning and platting moratorium on the Southwest area in 1977. The moratorium was replaced in February 1979 by the Southwest Interim Development District (SWIDD) ordinance. The interim ordinances established density limitations on various types of development while a Southwest Community Comprehensive Plan was being prepared.

A final draft of the Southwest Community Comprehensive Plan was submitted to the Ada County Commissioners in May 1980 for consideration. The residential density guidelines recommended in the comprehensive plan were adopted by resolution of the commissioners. These guidelines established a high density and a low density infill plan, dependent on the outcome of the central sewer feasibility study. The high density plan allowed four dwelling units per acre on central sewers in the designated residential part of the Southwest area. The low density plan allowed for two dwelling units per acre on community wastewater systems in the residential part of the area. A density level of one unit per 5 acres would have been permitted on individual wastewater systems.

As a result of public hearings on the comprehensive plan, and of workshops on wastewater alternatives, the Board of Ada County Commissioners adopted a land use plan for the Southwest community in August 1980. This land use plan, referred to as the "rural lifestyle alternative", contains a maximum density allowance of one unit per 5 acres for all new developments in areas designated "rural residential". Although higher densities could be permitted at some future time, the anticipated population for the Southwest in the year 2000 is 18,985. When complete infilling has occurred, the population is expected to increase to 20,385. The plan's land use map is shown in Figure 6-3.

Eagle Planning Area

In 1978, the Eagle City Council adopted the Eagle Comprehensive Plan. In general, this plan recognizes Eagle as a rural, suburban bedroom community of the Boise metropolitan area and encourages the continuance of its rural character. Recommended densities in the Eagle Comprehensive Plan permit a maximum of 5 units per acre in the core area and 3 units per acre outside the core area. The plan also encourages growth to occur first within the city limits so that public services can be planned for in an orderly manner.

Currently, efforts are under way to amend the Eagle Comprehensive Plan. Although the exact nature of the amendments is uncertain, it is believed that the comprehensive plan amendments would provide for the accommodation of growth south of the Boise River.

Consistency of Wastewater Facility Plans with Local Land Use Plans and Policies

EPA requires that wastewater facility plans be consistent with applicable land use plans and policies. This is to ensure that the facility planning area (or 20-year sewer service area) is consistent with the area which local land use plans have designated for extension of sewer service and other urban-type services. It is recognized that the location and phasing of wastewater interceptors can influence the location of development. As a result, it is important that the implementation of

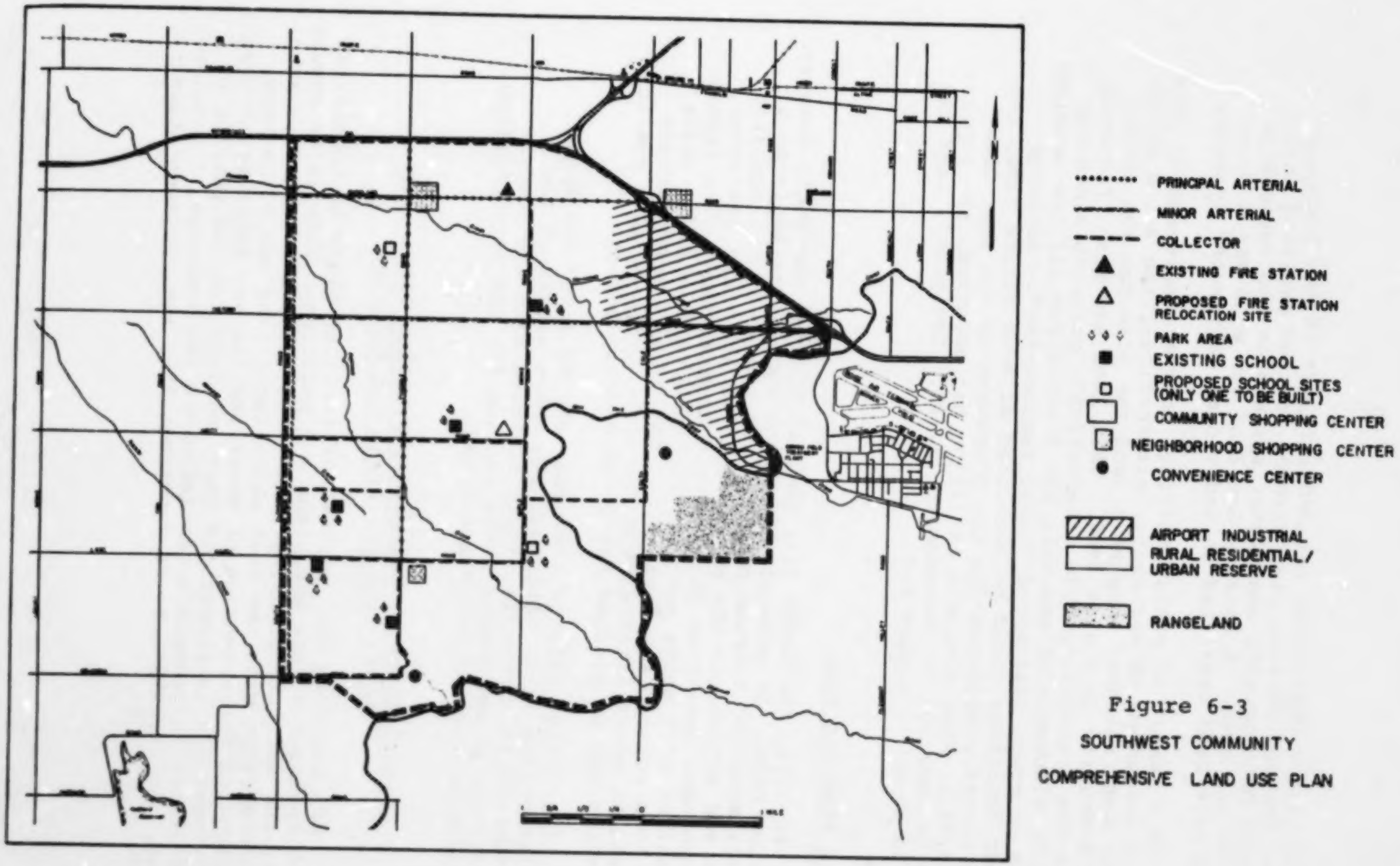

PRINCIPAL ARTERIAL
MINOR ARTERIAL
COLLECTOR
EXISTING FIRE STATION
PROPOSED FIRE STATION RELOCATION SITE
PARK AREA
EXISTING SCHOOL
PROPOSED SCHOOL SITES (ONLY ONE TO BE BUILT)
COMMUNITY SHOPPING CENTER
NEIGHBORHOOD SHOPPING CENTER
CONVENIENCE CENTER
AIRPORT INDUSTRIAL
RURAL RESIDENTIAL/ URBAN RESERVE
RANGELAND

Figure 6-3

SOUTHWEST COMMUNITY

COMPREHENSIVE LAND USE PLAN

wastewater facility plans be consistent with local land use and development policies. The following section evaluates the potential impact of facility plans on local land use plans and policies.

Boise Planning Area

The facility planning area in the Boise facilities plan roughly corresponds to the city's urban service planning area (USPA). As previously discussed, the USPA is the area which each city intends to provide with sewer and other "urban-type" services. Because the intent of the Boise facility plan is to provide sewer service to all residents within the facility planning area over the 20-year planning period, a general consistency exists between the Boise facility plan sewer service area and the sewer service area as designated in local land use plans.

A second important issue is whether the Boise facility plan provides for sewer availability in areas and, at a time which is supportive of local growth policies. The Boise Policy Plan recognizes the Southeast and Northwest areas as high priority development areas. Because the exact location and phasing of interceptors is uncertain, it is difficult to determine the impact of wastewater facility planning on land use. Some generalizations, however, can be made.

Stage 1 in the Boise facilities plan involves the extension of the South Boise Interceptor to provide additional sewer service to the Southeast area, a high priority development area. The other high priority area, the Northwest, is, however, not a part of the current EPA grant request but would be funded with local funds at a later date. With the city's sewer wetline policy in effect, it appears that sewer service in the Southeast area would be a somewhat higher priority than sewer service in the Northwest area.

Because of recent changing conditions (i.e., slower growth, fiscal constraints), the city is re-examining its growth policies related to priority development areas. Consequently, proposed developments in the Northwest and Southeast areas have been more closely evaluated and, in many cases, denied for lack of available or planned public services. The effect on land use has been to shift most developments to the West Bench area where public service capacity is available (Dopper, pers. comm.). The long-term implications of these development conditions on wastewater facility needs are uncertain.

Southwest Planning Area

The adoption of the Southwest Community Comprehensive Plan precludes, for the present, consideration of central or community wastewater treatment facilities for development in the Southwest area. As a result, individual on-site subsurface disposal systems will continue to be used for wastewater management.

The adopted land use plan for the Southwest area would essentially maintain the existing rural lifestyle which characterizes most of the area. Future development at higher densities, however, was not precluded by adoption of the comprehensive plan. Provisions to re-subdivide into higher densities could be implemented at some future date, if coupled with sewer service and other public services. In the meantime, the 5-acre minimum lot size requirement can be expected to significantly reduce new development in the Southwest area (APA 1980).

The preliminary 1980 census population of the Southwest Community is approximately 16,700. With a projected population of 18,895 persons in the year 2000, the Southwest area would increase by approximately 2,200 persons over the 20-year period. According to APA (Gross, pers. comm.), this growth will occur primarily on lots which had been approved for subdivision prior to adoption of the present density requirements (one unit per 5 acres). Because of the current high cost for land in the Southwest area ($6,000 to $10,000 per acre of unimproved land), there has been little demand for 5-acre lots (Gross, pers. comm.). As a result, it is assumed by APA (Gross, pers. comm.), that most of the growth projected for the Southwest area will occur on previously subdivided lots which are concentrated in the northern portion of the area.

Eagle Planning Area

The Eagle Facilities Plan discusses the potential need for wastewater facilities for Eagle planning areas A, B and C. Only planning area B, however, is slated for sewer service in the Eagle Sewer District proposed project. It appears that planning area B roughly corresponds with the city's designated urban service planning area and is consistent with the sewer service area shown in local land use plans.

Development has been encouraged to the east of Eagle. Whether it will be encouraged to the west of town is uncertain. It is expected that local planning objectives will be clarified at the conclusion of current efforts to amend the Eagle

Comprehensive Plan. It is assumed that future serviceable residential development will occur either within the existing city limits or in areas annexed and zoned by Eagle in accordance with the comprehensive plan. The county's wetline policy will be the determining factor. It is likely that sewer service will be provided to new development wherever development densities are sufficient to warrant service.

Chapter 7

URBANIZATION OF AGRICULTURAL LANDS

Introduction

Prime farmland is a nonrenewable resource; its conversion to urban uses is essentially an irreversible process. In recent years, the urbanization of agricultural land, especially prime farmland, has become a growing national concern. As a result, the U. S. Council on Environmental Quality (CEQ) issued the following directive concerning highly productive farmlands. "...efforts should be made to assure that such farmlands are not irreversibly converted to other uses unless other national interests override the importance of preservation or otherwise outweigh the environmental benefits derived from their protection" (CEQ 1976).

National policies to slow the conversion of prime farmland have been developed for several reasons. Some of the more important reasons include:

- It is increasingly important to preserve those lands best able to produce crops because the rate of farm productivity growth has been decreasing and export demands are increasing.
- Farmland preservation provides open space, aesthetic, and environmental benefits.
- Agricultural production provides important benefits to many local economies.

Because of these and other factors, EPA in 1978 established an agency-wide policy to assure that its actions, regulations, and programs reinforce the retention of environmentally significant agricultural land (EPA 1978d).

This chapter examines the agricultural land resources within the three planning areas; discusses county preservation policies to protect agricultural land; assesses the impact on agricultural lands from the proposed projects and recommends measures to mitigate adverse impacts on important agricultural lands.

Agricultural Land Resources

Although Ada County has historically been viewed as the center for business and government in Idaho, agriculture has also played an important role in the local economy. In 1974, the total market value of all agricultural crops from Ada County surpassed $34 million, a significant portion of which was harvested in northern Ada County. Principal farm products include wheat, barley, alfalfa, corn, livestock and livestock-related products.

Definition of Agricultural Lands

The terms prime farmland, cropland, and important farmland are important to distinguish for purposes of this analysis. The following definitions will be used:

- Prime farmland:

  Land suitable for farming or silviculture with "soil quality, growing season, and moisture supply needed to economically produce sustained high yields of crops when treated and managed, including water management, according to acceptable farming methods" (Lee, 1978). Prime farmlands are the "most efficient, energy conserving, environmentally stable lands available for meeting food needs" (CEQ, 1978).

- Cropland:

  Land in cropland use. Not all cropland is prime farmland.

- Important farmland:

  Important farmland is that farmland being mapped by the U. S. Soil Conservation Service (SCS) under its current (LIM-3) mapping program. It consists of the following categories: prime farmland, unique farmland (additional farmland used for the production of specific high value crops), additional farmland of statewide importance (to be determined by state agencies), and additional farmland of local importance (where appropriate, to be determined by local agencies).

Location of Important Farmland

The SCS has recently completed a soils survey for Ada County. In addition, as part of their LIM mapping program, SCS has identified prime farmlands in Ada County. Figure 7-1 presents the distribution of prime farmland within the three planning areas.

Current Agricultural Production in the Planning Areas

Although a significant amount of SCS-designated prime farmland exists within the three planning areas (as shown in Figure 7-1), a considerable portion of these lands is not currently under intensive agricultural production. The following section summarizes current agricultural activities within the planning areas.

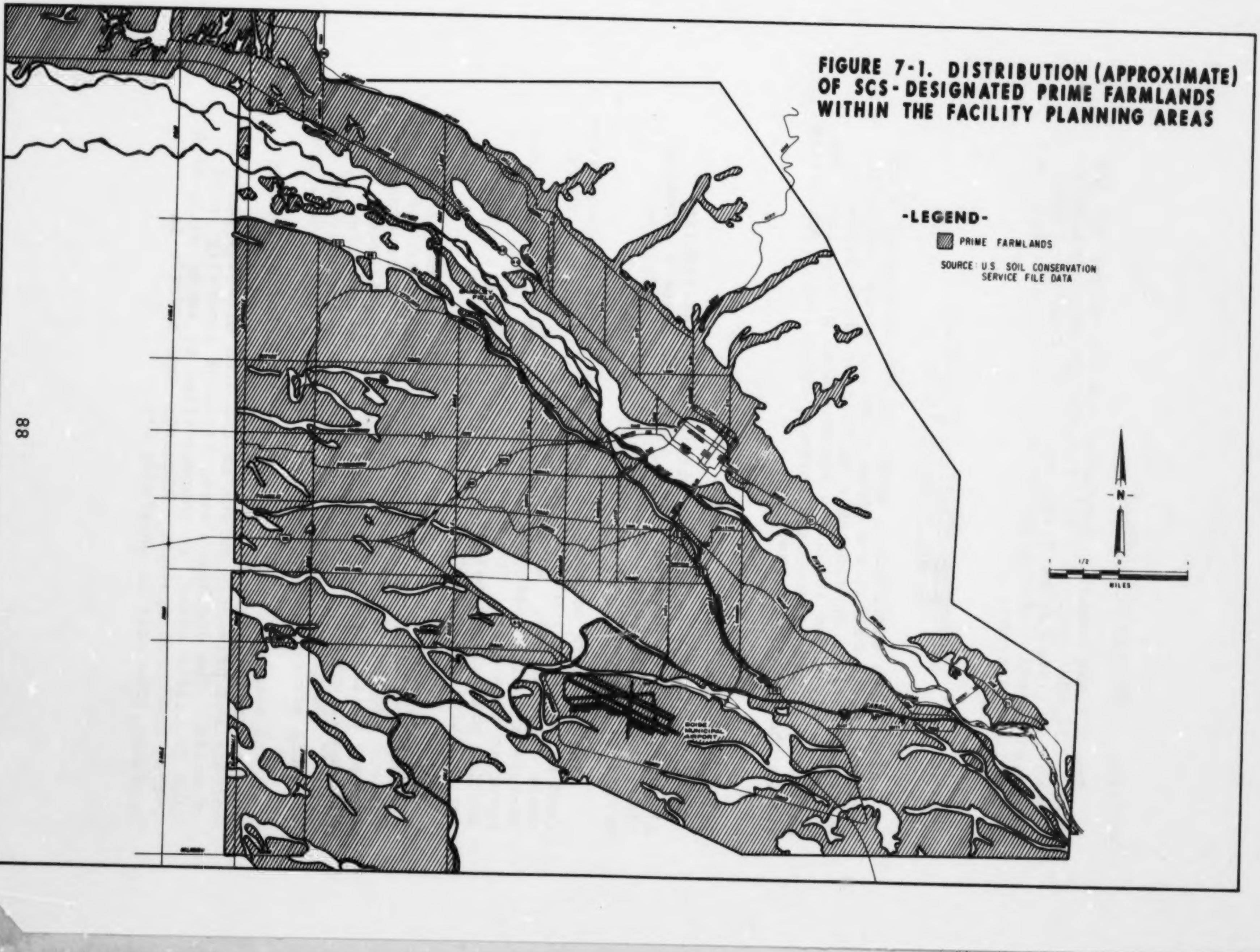
Boise Planning Areas

Agricultural production within the Boise facility planning area is diverse. As a result of Boise's urbanization, most of the significant agricultural production occurs at the periphery of the planning area.

The northern section of the planning area is characterized by older agricultural operations of relatively small scale (5-20 acres). Much of the area is grassland and pastureland with scattered residences. Some cow operations occur in this area. The eastern portion of the northern section primarily consists of rolling hills with some agricultural production in the valleys.

To the west of the City of Boise, scattered pastures predominate. Considerable cropland exists toward the western edge of the facility planning area. This area between Boise and Meridian is primarily open farmland with soils considered "probably as good as anywhere around" (Walker pers. comm.). The primary agricultural products are corn, grain, alfalfa and some dairy operations.

The South and Southeast areas of the Boise planning area are mainly pastureland and grazing areas. The pastureland primarily exists in the area directly south of Boise. The Southeast area, although generally level with available water, is characterized by sandy soils with gravel beds interspersed. Although some alfalfa is produced, the area is generally dry.



BOISE MUNICIPAL AIRPORT
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FIGURE 7-1. DISTRIBUTION (APPROXIMATE) OF SCS-DESIGNATED PRIME FARMLANDS WITHIN THE FACILITY PLANNING AREAS

-LEGEND-

▨ PRIME FARMLANDS

SOURCE: U.S. SOIL CONSERVATION SERVICE FILE DATA

Southwest Planning Area

Because of a high water table, the Southwest area is not considered exceptionally good for large-scale agricultural production (Walker pers. comm.). In addition, some hardpan sites are scattered throughout the Southwest area. The Southwest area is characterized by a considerable number of local, subsistance-type (3-10 acres) farming operations.

Eagle Planning Area

The Eagle facility planning area is characterized by numerous "gentleman farms" (5-10 acres) and several larger-scale operations. Some feed lot operations occur in the northern portion of the planning area. On the higher benches, some potatoes are grown. Many retired farmers are located on the eastern edge of the planning area (Walker pers. comm.).

Ada County Agricultural Land Policies

The preservation of agricultural land has received considerable attention within Ada County. Preservation of agricultural resources was formally recognized as an important public issue in Ada County with the formulation of goals, objectives and policies in the 1974 Ada County Concept Plan (ACOG 1975b). Since the concept plan was formulated, numerous preservation programs have been recommended.

Of primary importance to Ada County's efforts to preserve agricultural lands was the adoption of the Ada County Comprehensive Plan. For rural areas, this plan provides for agricultural preservation with development policies which maintain large agricultural parcels. Implementation of the policies has been provided by adoption of an amended zoning and subdivision ordinance.

In areas where potential conflicts between urban and agricultural uses are expected to occur, future urban areas are defined by Urban Service Planning Area (USPA) designations. These USPAs are areas "where municipal sewer facilities and most other services and utilities are available or planned". In effect, the USPA designation encourages development to occur within existing or planned urbanized areas. One important implementation measure of the USPA concept is the sewer wetline ordinance. This policy restricts development to areas where sewer service is available.

Policies to protect agricultural lands within the municipal boundaries of Eagle and Boise are limited. Although the Eagle Comprehensive Plan recognizes the importance of minimizing disruption to agricultural lands, the comprehensive plan policies only address the areas located outside of the facility planning area. These lands are currently within the County's zoning jurisdiction.

The preservation of agricultural lands within the Boise City limits was not discussed in the Boise Policy Plan. Currently no zoning classification exists specifically for agricultural lands within the City of Boise.

Urbanization of Agricultural Lands from the Proposed Projects

Boise Planning Areas

Based on development policies expressed in the Boise Policy Plan, future growth is encouraged in the Southeast and Northwest areas. As shown on Figure 7-1, both the Southeast and Northwest areas consist primarily of SCS-designated prime farmland. The impact of growth in these areas would be to convert a significant amount of SCS-designated prime farmland to urban uses.

Although a major portion of the Southeast and Northwest areas are SCS-designated prime farmland, current agricultural production in these areas is limited. At present, the Northwest area consists primarily of grassland with residences scattered throughout most of the area. Although some lands are currently under agricultural production, these are generally older gentleman-type farms. Projected growth for the Northwest would likely reduce considerably the number of existing agricultural operations in the area.

Current agricultural production in the Southeast area is limited primarily to grazing land. Although the Southeast area is flat and is mostly designated prime farmland, the area has relatively sandy soils and is generally dry. The impact of growth projected in the Southeast would be to significantly reduce grazing areas considered to be of marginal agricultural value from a current production standpoint.

Although the Northwest and Southeast areas are considered high priority development areas, most of the current development is occurring in the West Bench area. This area contains some significant agricultural land resources in terms of both designated prime farmland and current cropland production. Continued westward expansion of development toward Meridian would significantly affect current agricultural operations in the area.

In summary, most of the growth projected for the Boise planning area is expected to locate in the Southeast and Northwest areas. Although the major portion of these areas is designated prime farmland by the SCS, current agricultural production is limited. Therefore, while the impact of growth on the conversion of SCS-designated prime farmland is considered significant, the impact of growth on current agricultural production is considered marginal. If growth, however, continues in the West Bench area, the impact on current agricultural operations in that area would be significant.

Southwest Planning Area

Future development in the Southwest planning area is expected to be concentrated in the northern section of the area. This northern section contains considerable SCS-designated prime farmland (See Figure 7-1) but is not currently under intensive agricultural production. Two important limitations on larger-scale agricultural production are the relatively high water table and scattered hardpan sites. Because the Southwest area consists primarily of local subsistence farming and because of density restrictions on future development (one unit per 5 acres), the impact of growth on current agricultural production is not expected to be significant.

Eagle Planning Area

The Eagle facility planning area is almost entirely SCS-designated prime farmland. The impact of projected growth on designated prime farmland would be significant.

Although much of the Eagle facility planning area is currently under agricultural production, most use involves "gentleman farms" of relatively small scale (5-10 acres).

Because it is uncertain in which locations growth is likely to occur, it is difficult to assess the impact of growth on current agricultural production. If development is concentrated in relatively few areas, the impact on current agricultural production could be minimized. If, however, considerable numbers of annexations occur and developments are dispersed throughout the planning area, the impact on current agricultural production would be more significant.

Mitigation Measures

Because the facility planning areas are consistent with local urban services planning area boundaries, EPA is not recommending any grant conditions concerning agricultural lands. However, in accordance with EPA and CEQ policies which recognize the importance of prime farmlands, EPA recommends the following measures:

- Local agencies identify "farmlands of local importance" which would supplement SCS's current mapping program of important farmlands. Evaluation criteria would likely include: soil characteristics, location of farmlands to urban development, parcel size, and current economic productivity.

- Restrict future development in areas designated as "farmlands of local importance" through adoption of a local ordinance which prohibits the extension of utility infrastructure to these areas.

Chapter 8

PUBLIC SERVICES AND FACILITIES

Introduction

Wastewater planning for Boise, the Southwest area, and Eagle is based on 20-year population growth projections. Growth within the three areas will increase demands on key community services in addition to wastewater management. This chapter examines the following community services: drainage, water supply, electricity and gas, transportation, solid waste management, schools, police protection, fire protection, and recreation. Measures are identified which could mitigate the impacts of growth on community service delivery. In addition, because the provision of community services will depend on the ability of local service agencies to pay for growth, the fiscal structure and capabilities of service agencies within the planning areas are discussed.

Provision of Community Services

There is a wide variation in the specific pattern of responsibility for service provision in the greater Boise area. First, certain services are provided by public agencies in some areas and by private entities or individuals themselves in other areas. For example, while urban populations of Boise are provided sewer service by the city, in less densely settled portions of Ada County on-site wastewater systems are frequently installed and maintained by individual property owners.

Second, certain services are provided by local general purpose government in some areas (particularly in Boise) and by special purpose districts in others. In the City of Eagle, virtually all services except general government are provided by independent agencies: sewer, water, schools, fire. Throughout the county, public education is provided by school districts rather than by general purpose government.

These variations suggest the difficulty of generalizing about the provision of community services. Depending on where a residence or business is located, it may receive a different package of community services from a different set of service providers, and these differences result in further differences in the quality/quantity of service provided and its cost. Altogether, there are 50 different public agencies in Ada County with service responsibilities and taxing authority.

Current Capabilities of Community Service System

Most public service agencies within the planning areas are experiencing difficulties in meeting the service requirements of existing populations. Rapid population growth during the 1970s is one of the primary causes of these service shortfalls. In addition, recent fiscal constraints, coupled with high inflation, have further hindered the delivery of historic levels of service. This section reviews the current capabilities of the community service system.

Drainage

Among the public services provided to the cities and communities of Ada County, drainage is probably the most deficient. Further, the county faces a worsening drainage problem in unincorporated areas due primarily to lack of an effective mechanism to plan, construct and maintain adequate urban drainage facilities. The problem is particularly noticeable in the developing fringe areas, and is likely to respond adversely to continuing growth. Similar problems exist in the incorporated cities, including Boise.

The problem stems from: 1) the lack of an adopted areawide drainage plan, 2) the lack of consistent areawide drainage criteria, 3) the lack of consistent enforcement of drainage requirements concurrent with development, and 4) the absence of agencies funded to maintain existing drainage facilities.

The problems are currently manifested by flooding with property damage during heavy storms; overflow of the irrigation canals and ditches which intercept runoff from urbanizing rural areas; concern by irrigation districts regarding urban pollutants in runoff water; varying quality and effectiveness of drainage facilities installed by developers; damage to, failure of, and nuisance conditions from unmaintained drainage facilities; and vocal concern about present and future drainage problems by local government officials.

Within the City of Boise, many of the older drainage facilities are undersized and/or deteriorated, and even new facilities tend to become overloaded from increased runoff from developing tributary areas. Inadequate records of the location, sizing and existence of storm drains further complicates the problem.

There are many small subdivision areas along the Boise Front and in the Southwest area that have been developed with retention pond facilities in the last few years. Most of these ponds are not maintained; they exhibit this lack of maintenance in erosion, decreased capacity, furtively dumped solid waste, and weeds and brush that constitute a fire hazard.

In the Southwest area relatively flat conditions prevail and the ponds tend to be continuously wet from surplus lawn irrigation, car washing and other outdoor water uses. Weed growth and mosquitos tend to be problems associated with these ponds. Silts and sediments, as well as organic debris from vegetative growth tend to fill the ponds and decrease storage capacity. Wet ponds with aquatic growth may support some wildlife that otherwise would be absent from the urban fringe areas. The ponds tend to be an attractive nuisance and could attract children. The potential for drownings and injuries related to pond use does exist, even when the ponds are fenced. Many fences are improperly designed, constructed, and maintained. Access to ponds for maintenance is often difficult, and pond construction itself may make maintenance difficult.

Appendix D of the Draft EIS presents additional discussion of drainage problems. A February 1980 Drainage Task Report is available at EPA's Boise operations office, and has been widely circulated to relevant public agencies.

Water Supply

Boise. Boise's source of domestic water supply is groundwater. Both shallow and deep aquifers are used, with the shallow aquifer supplying individual wells and the deep aquifer supplying the community system. The Boise Water Corporation is the largest water purveyor in the Boise area, supplying some 90 percent of the total water supply (ACOG 1973b). Annual water demand in the Boise area in 1972 was 5,865 million gallons. Demand was projected to increase to 12,800 million gallons by 1992 (ACOG 1973b). Groundwater supplies appear adequate to meet the demands which will be generated by projected growth; the Boise planning area population is projected to increase to about 212,000 by the year 2000 (APA 1978). Additional wells, water storage facilities, and water distribution facilities will be necessary to meet future demands.

Southwest Area. The Southwest area depends on shallow groundwater for individual wells and deeper groundwater for community supply. About one-half of the 4,350 residential lots in the Southwest area receive domestic water from a community system; the other one-half rely on individual wells. The Boise Water Corporation supplies about 7,000 Southwest area residents, almost half the area's population. Small portions of the Southwest area are also served by the Ash Park Water Company and the South County Water Company.

Irrigation water is provided by the New York Canal which transports about 900,000 acre-feet annually (ACOG 1973b). Three irrigation districts supply irrigation water to the Southwest area, the New York district (serving 5,500 acres), the Nampa and Meridian District (serving 1,500 acres), and the Boise-Kuna District (serving 300 acres) (APA 1980).

Implementation of the "rural lifestyle" alternative for the Southwest area would increase the area's population to 18,985 (APA 1980). The Boise Water Corporation has not projected any major problems in serving this growth, but cautions that continued development using on-site systems should include a long-term operation and maintenance program to reduce the risks of groundwater contamination (APA 1980). Policies in the Southwest Community Comprehensive Plan (APA 1980) encourage existing residential developments with gross densities greater than one dwelling per five acres served by individual systems to connect to community systems.

Eagle. Eagle uses groundwater for domestic water supply and surface water for irrigation. Domestic water is supplied by individual wells and by the Eagle Ranch Water Company, which in 1977 provided well water to 300 customers (Eagle Planning and Zoning Commission [PZC] 1978). Irrigation water is provided by the Boise River and the Dry Creek Canal.

The Eagle area is expected to reach a population of 13,286 by the year 2000. As the population increases, new wells and new water storage and distribution facilities will be needed. The study plan for the Eagle Water and Sewer district (J-U-B Engineers 1978) has policies to coordinate future growth with water supply provision, and to assure that expansion of water district boundaries is consistent with the boundaries delineated in the Eagle Sewer and Water Plan (Eagle PZC 1978).

Gas and Electricity

The Intermountain Gas Company supplies natural gas to all of Ada County. Natural gas in 1979 was distributed to 32,450 customers countywide through 821 miles of gas mains (McKinney pers. comm.). Growth in Boise, the Southwest area, and Eagle will generate additional demands for natural gas; natural gas supplies appear adequate to meet these demands.

The Idaho Power Company supplies electricity to all of Ada County; its service area is 20,000 square miles in southern Idaho, eastern Oregon, and northern Nevada. The company mainly relies on hydropower for electricity generation, operating 16 hydro plants, in addition to a combustion turbine and sharing ownership in a coal-fired plant. Idaho power is currently developing an energy conservation program to slow growth in demand. Population growth in Boise, the Southwest area, and Eagle will create additional electricity demands. The long-term supply and demand outlook for electricity is uncertain.

Solid Waste Management

Most of Ada County's solid waste is disposed of in Hidden Hallows sanitary landfill, located about 5 miles north of the Boise City limit. Solid waste in Ada County is collected by private firms. Browning and Ferris Industries collects solid waste in Boise and Eagle; solid wastes in the unincorporated Southwest area are collected by Boise-Ada Disposal Company.

In 1979, the landfill was receiving about 400 tons per day; capacity is expected to be reached in 1985. At present, three options are under consideration to provide future management of solid wastes. They include: expand the present landfill site; move to a new landfill site south of Boise; or construct a waste-to-energy plant (Neil pers. comm.).

Transportation

The Ada County Highway District (ACHD) is responsible for the construction and maintenance of local streets and highways in Ada County. The City of Boise provides transit service through the Boise Urban Stages bus system, with operation of the system provided by contract with Transit West Services, Inc. Service is provided within the City of Boise and Garden City, Monday through Saturday. In general, buses operate between 6:30 a.m. and 6:30 p.m. Various intercity and commuter bus lines provide additional transit service to and from Boise. Carpool and vanpool programs in the Boise area are coordinated by ACHD. Short-range and long-range transportation planning is provided by the Ada Planning Association.

Several streets in the downtown area of Boise experience significant traffic congestion during rush hour periods. Access into the downtown area from the south and west is provided by four roadways. Two of these (the Fairview/Main couplet and Capitol Boulevard) experience peak hour congestion problems. Continued growth in the Boise area will result in increased travel demand on local highways. Completion of redevelopment projects in the downtown Boise area will add a major new trip attractor to that area.

Current transportation planning focuses on a variety of highway improvement projects, transit system improvements, and ridesharing programs to accommodate future travel demands on existing and planned roadways. A number of specific highway improvement projects anticipated for the 1980-1987 and 1987-2000 time periods were identified in Appendix A of the Draft EIS. Current transit system planning is oriented toward a goal of capturing 20 percent of the 1990 commuter trips to the downtown area, while expanding off-peak ridership to equal 50 percent of total daily ridership. Accomplishing these transit goals will require the purchase of 44 new buses during the 1981-1986 period. The 1987 transit plan (APA 1980c) estimates total capital costs for this fleet expansion (plus associated maintenance facilities, bus shelters, etc.) at $11,170,000, with annual operating costs of $5,840,000. Actual implementation of these plans will be highly dependent on the availability of funding.

Schools

Boise. The Boise School District currently operates 26 elementary schools, 5 junior high schools and 4 senior high schools. At the junior and senior high school levels, there is currently no significant overcrowding conditions within the City of Boise (Boise School District, pers. comm.). At the elementary level, "closed enrollment" conditions currently exist in the Southeast area. A bond issue which would provide funds for construction of a new elementary school in the Southeast will likely be voted on in Spring 1982.

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As a result of attrition and the One Percent Initiative, the Boise School District has had slight reductions in personnel. Because of legislation enacted subsequent to the one percent Initiative, however, the impact on the school district has not been as severe as anticipated.

Population growth in Boise will increase the need for additional schools. In addition to the Southeast area, the Northwest area has been identified as the next area where additional schools will need to be constructed. At the present time, some students are bussed to schools in the central area.

Southwest Area. Most of the Southwest area is served by the Meridian and Boise School Districts, which together operate four elementary schools and one junior high. Presently, all schools in the Southwest area have enrollments in excess of their capacity (APA 1979a).

Under the Southwest Community Comprehensive Plan "rural lifestyle" alternative, it is projected that one additional elementary school would be needed, but that the existing junior high would be sufficient to accommodate projected growth (APA 1980). Policies in the plan provide for developer dedication of land or payment of fees for the acquisition and development of school sites, but the feasibility of implementing these policies is questionable (APA 1980).

Eagle. Students from the Eagle area attend schools operated by the Meridian School District. At the elementary levels, students from Eagle attend one of two schools. Both elementary schools have projected additional capacity for the 1982 school year (Hind pers. comm.). At the junior high level, additional capacity is projected for the 1982 school year at the Lowell Scott Junior High School where students from Eagle would attend. Enrollment at the senior high school is projected to be in excess of its recommended capacity. A bond issue, which would provide funds to construct a second high school, is expected to be voted on in Spring 1982.

Growth projected for the Eagle area would contribute to the need for additional schools in the Meridian School District. A new elementary school in the Eagle area and a new junior high school will be needed in probably 5 or 6 years (Hind pers. comm.).

Police Protection

Boise. Police protection in Boise is provided by the Boise Police Department. The current ratio between police officers and the city's population is 1.17 officers per 1,000 population; this ratio is well below the state and national average of 2.1 officers per 1,000 population.

As a result of primarily the One Percent Initiative, the Boise Police Department has been reduced by 23 officers. To compensate for these reductions on personnel, adjustments in the scheduling of officers has become necessary. In addition, prioritization of calls for police response has been implemented.

Projected growth for Boise will further reduce the officer-to-population ratio unless additional funding is provided. The effect will likely be to increase the response time to lower priority police calls.

Southwest Area. Police protection in the Southwest area is provided by the Ada County Sheriff's Department. The current officer-to-population ratio is below the ratio of 0.67 officers per 1,000 population recommended in the Southwest Community Comprehensive Plan (APA 1980). Because of recent changes in fiscal conditions, the Ada County Sheriff's Department has been reduced by 15 officers. Similar to the Boise Police Department, the Sheriff's Department has adjusted schedules and prioritized response call to compensate for reduced personnel (Taylor pers comm.). Additional growth will likely increase the response time to lower priority calls.

Eagle. Police protection in Eagle is provided by the Ada County Sheriff's Department. Because of recent cutbacks in personnel, the Sheriff's Department is re-examining the police protection needs within their service area. It appears that urban areas such as Eagle which currently contract for Sheriff services will be required to provide additional funding in the future to maintain their current level of service (Taylor pers. comm.).

Fire Protection

Boise. The Boise Fire Department operates a number of fire stations, each intended to serve a 1.5-square-mile area. There is currently adequate fire flow within the city and response time is considered generally adequate (Boros pers. comm.). Additional fire stations may be needed to meet the fire protection needs of the growth projected for Boise.

Southwest Area. The Southwest area is provided fire protection by the Whitney Fire District which operates one fire station on Overland Road. Many portions of the area currently experience water supply or water pressure problems. The limited growth projected for the Southwest area under the "rural lifestyle alternative" probably will not require the construction of a new fire station (APA 1980). Policies in the Southwest Community Comprehensive Plan encourage provision of adequate fire flows in the future (APA 1980).

Eagle. Eagle is provided with fire protection by the Eagle Fire District, which is staffed by volunteers. Future growth to 13,286 would require at least one additional fire station to be built and the acquisition of additional equipment (Eagle PZC 1978).

Recreation

Boise. Two large community parks along the Boise River (Ann Morrison and Julia Davis Parks) provide regional recreation opportunities for Boise residents. Boise also has numerous smaller neighborhood and community parks. In the future, the Boise River "greenbelt" will continue to be the major focus of recreation in Boise, and additional parks will continue to be provided as Boise's population grows (Boise Planning and Zoning Department 1979).

Southwest Area. Currently, recreation facilities in the Southwest area are limited to a 5-acre neighborhood park. The Southwest area has mainly relied on county and City of Boise park facilities and on school playgrounds to satisfy recreational needs. Under the "rural lifestyle" alternative, an additional 31 acres of neighborhood parks would be needed but a new community park may not be needed (APA 1980).

Eagle. Eagle presently has one neighborhood park with one other park under construction. The population increase projected for Eagle will generate the need for more and larger parks in the future.

Summary of Community Service Capabilities and Potential Impacts of Growth

The growth projected in the facility planning areas will increase the demands on local community services. Some services appear to be more capable of accommodating the projected growth than other services.

In general, the community services most likely to be significantly impacted in the near term are police and fire protection. Because these services have already been significantly impacted by recent fiscal conditions, additional near-term growth will likely aggravate existing deficiencies. If near-term growth consists of a significant number of school-age children, schools could also be significantly affected.

The longer-term growth impacts will impinge on community services which need costly investments for infrastructure expansion. This includes primarily drainage, water supply, and transportation improvements.

In conclusion, the impact of projected growth on the community service system will depend on the ability of local service entities to finance expansion of service and needed capital improvements. This will likely require new and innovative approaches to the financing and structure of community services delivery. The following section summarizes some of the measures which could potentially be implemented.

Mitigation Measures

In an effort to coordinate growth and the provision of community services, local agencies have developed policies related to community services extension. Both the City of Boise and Ada County review proposed developments for availability of all community services and for consistency with urban service planning area (USPA) boundaries. If all services cannot be provided within the USPA, the proposed development is subject to denial. To the extent that these growth policies are followed, the potential adverse impacts on growth on public services will be mitigated.

If local community service policies are not followed, local service deficiencies are likely to occur. As part of the fiscal assessment developed for this study, a number of measures have been identified which could help mitigate the adverse impacts of growth on local service agencies. Some of the measures include:

- district consolidation
- more private responsibility for delivery of services
- increase growth management fees
- establish local option taxes
- more financing through bonds
- obtain more state and federal funds

These measures are discussed in more detail in the following section. In addition, Ada Planning Association has prepared a study on the growth management fees approach to financing community service needs (Business Economics, Inc. 1979).

Organization of Local Government Finance

Certain of the features of local government finance in Idaho are common to the various entities empowered to provide services and to tax, and these similarities arise from state legislation regulating the operations of local governments. Some of the most important aspects of the finance system are described below.

Balanced Budgets. The State of Idaho requires that the budget for any given year must be in balance. As a practical matter, this means that local agencies typically understate their revenue anticipation so as to ensure that they will not find themselves with a revenue shortfall at the close of the fiscal year.

An exception to the rule is Boise, which operates on a tax anticipation basis rather than a cash basis, a practice predating the state's 1977 balanced budget requirement.

Revenue Sources. Property taxes have long been the mainstay of local government finance in Idaho. Table 8-1 shows the extent to which local governments in Ada County have depended on property taxes in the past. This dependence has been declining throughout the 1970s, and the One Percent Initiative seems likely to further reduce local agencies' reliance on the property tax.

Table 8-1. PROPERTY TAXES AS PROPORTION OF LOCAL BUDGET IN SELECTED ADA COUNTY JURISDICTIONS

	Ada County	Ada County Highway District	City of Boise	Boise School District
1971	42.1%	39.3%*	36.2%	51.4%
1976	33.4%	37.5%	19.01%	48.6%
1979-80	43.7%	31.6%	15.09%	43.6%

*1972.

Source: Boise City, 1979-80. Boise City Budget.

Other taxes may be imposed at local option if authorized by state legislative action. Examples of such taxes now in effect are taxes on liquor-by-the-drink in McCall and Sun Valley (both major visitor areas). The sales tax, which is an important local tax in some other states, is a trivial element in the local tax structure in Idaho, although a local sales tax could be tacked onto the state's three-percent rate as a local option (again, state approval would be a prerequisite).

Other current revenue sources include federal and state grants and revenue sharing; fees, fines, reimbursements for services, licenses and permits; interest; rents; and miscellaneous other sources. Table 8-2 sets forth the distribution of revenues in the Cities of Boise and Eagle in their 1979-80 budgets.

Table 8-2. REVENUE SOURCES IN BOISE AND EAGLE

	City of Boise		City of Eagle	
Source	Annual Revenue (Thousands)	Proportion from That Source	2nd Quarter Revenue (Thousands)	Proportion from That Source
General/ Property Taxes	10,100.0	15.1%	18.3	55.0%
State Shared Sales Tax and Liquor Tax	1,300.0	1.9%	3.6	10.8%
Federal and State Grants	27,000.0	40.5%	0.2	0.6%
Revenue Sharing	1,700.0	2.5%	3.2	9.6%
Fees, Fines and Reimbursements for Services	12,700.0	19.0%	6.6	19.8%
Licenses and Permits	800.0	1.2%	0.5	1.5%
Interest Income	400.0	0.6%	0.9	2.7%
Rents	2,000.0	3.0%	-	-
All Other	10,800.0	16.2%	-	-
TOTAL	66,700.0	100.0%	33.3	100.0%

Source: Boise City, 1979-80. Boise City Budget, p. xvii. Eagle City, 1980. Statement of Revenue for the Quarter Ended March 31, 1980. Note that Eagle's revenue statement is for the second quarter of the fiscal year while Boise's is an estimate for the entire fiscal year. Comparable data for the county are not available.

Administrative Structure for Property Tax Collection. Each local taxing entity sets its own tax rate. Because the jurisdictional boundaries of these entities differ, neighboring properties can have different composite tax rates if their properties lie in different taxing districts. Each possible combination of taxing districts is called a tax code area and in Ada County there are over 200 different tax code areas, which is to say areas within which the combination of service-providing entities (and therefore the composite tax rate) is different from all other areas of the county.

While the One Percent Initiative and related state legislation limited the basic property tax take to one percent of market value, it did not revise the administrative structure, and that has made the impact of the Initiative more severe. Since state law provides that each taxing entity must have a uniform rate of property taxation throughout its jurisdiction, each tax code area within that jurisdiction shows the same tax rate for that particular service. But since in no tax code area may the composite rate exceed the one percent of market value level, the tax code area in which the maximum tax burden is imposed is the highest tax code area in the county, and the rates in all tax code areas with service entities overlapping the one percent area must reduce the various service entities' tax rates in order to maintain the same rates throughout each service jurisdiction.

Thus, the one percent upper limit is not achievable throughout the county: most tax code areas must have lower rates in order to observe the requirement of rate consistency within jurisdictions, and as a result the reduction in property tax revenues effected by the One Percent Initiative has been considerable. A recent study (Business Economics, Inc., 1979) estimates Boise City's reduction in property tax revenues as 55.36 percent, and every taxing entity whose jurisdiction overlaps the City of Boise (for example, Ada County and the Boise School District) has had to absorb the same reduction.

Market Values and Property Taxes. Property taxes generally are calculated as the rate (determined by the taxing entity) times the value of the property, which in most parts of the United States is the assessed valuation as determined by the county assessor's office.

It is typically the case that state law mandates or guides the manner in which local officials value property. Idaho law requires that by 1982 assessed valuations must be a uniform 20 percent of fair market value. In the past, there has been considerable variation in local valuation practice, and a more typical ratio of assessed valuation to market value was probably 10 percent. While certain local governments (such as

Boise) moved rapidly in response to the legislation to bring their valuations up to the 20 percent level, others moved more slowly, and when Initiative Petition No. 1 passed, property in those jurisdictions was still undervalued. These governments have been able to revalue property to the 20 percent level since the Initiative passed, and this has cushioned somewhat the immediate impact of the Initiative in those jurisdictions.

Under the provisions of the One Percent Initiative, property may be revalued but the revaluation is limited to an increase of two percent per year from a 1978 base. Over time, assuming recent inflation rates persist, the property tax base will represent an ever decreasing portion of total market values as a result of this limitation. Only new improvements and properties that change hands are excluded from this limitation.

Bonding. It is common practice throughout the nation for the capital facilities requirements of public services to be financed through bonds. Such government bonds may be either general obligation bonds (repaid from the jurisdictions' general revenues, such as property taxes) or revenue bonds (repaid through charges imposed for the specific service provided by the facility financed via bonds).

These kinds of public finance instruments have not been used as extensively in Idaho as they have in more urban states and as a result none of the local jurisdictions - Boise, Eagle or Ada County - has reached the limit of its bonding capacity (ten percent of assessed valuation). This finance tool must be mentioned, however, because it represents one of several possible ways of financing public improvements independently of restrictions on property taxes (bonded indebtedness is specifically excluded from the one-percent property tax limitation). On the other hand, financing via bonds is not particularly popular in Idaho, where there is a strong tradition of pay-as-you-go financing. School bonds have failed to receive the required two-thirds approval in the past, and every bond measure - such as the $7,000,000 airport bond measure approved by Boise voters in November 1979 - must be fully explained to and understood by the voters in order to obtain approval.

Fiscal Prospects: The Short-Run Picture

In the short run, all three local general purpose governments - Boise, Eagle and Ada County - are experiencing similar conditions: a sharp decline in revenue relative to three years ago, and consequently pressure to accommodate this change by altering the revenue structure and/or the volume of service delivered.

Declining Revenues. Initiative 1, as implemented by the Idaho Legislature on an interim basis, froze local budgets for a 3-year period at their 1978 levels. In anticipation of the passage of the Initiative, some local governments have already begun to trim budgets prior to June 1978, and it is those governments (Boise is one) that have been hit hardest by the across-the-board budget freeze.

With budgets frozen during an inflationary period, the actual fiscal impact has been more severe than simply a frozen budget may suggest. The costs of providing government services, like the costs of other goods and services in the economy, continue to rise with inflation. Just as households have to spend more to maintain their historic standard of living, governments have to spend more to maintain their historic levels of service delivery. That simply cannot be done on a frozen budget.

In March of this year, the Legislature enacted a bill which provides some relief to the frozen budget situation of local governments. The enactment of HB389 allows for a 5 percent increase in the ad valorem budget of local governments. Under certain rapid growth conditions, local budgets can be increased by more than 5 percent.

Property taxes are not the only revenues that have declined. With the rising mortgage interest rates of the last two years, the downturn in housing construction and the current recession, development-related fees have also declined, which has hit Ada County particularly hard since much of the revenue supporting the Growth Management Department derives from fees. Fee levels have been increased, but total collections still appear to be falling short of the level normally needed to support past levels of planning and land development regulation activities.

Uncertain Direction of Future Implementation of Initiative No. 1. The passage of the Initiative did not specify the means of implementation, and the State of idaho (lacking the kind of surplus that California had when the similar Proposition 13 was passed in that state) has taken only interim measures to date to remedy some of the problems posed by the property tax limitation. An important step has been the earmarking of certain revenues from the three percent state sales tax to relieve the fiscal plight of the school district.

However, further measures appear in doubt. The apportionment question (how to allocate tax rates or total tax revenues among taxing districts) poses a particularly difficult problem for whoever decides to address it, whether at the state level or at the county level. And with this question unresolved, local agencies, particularly those in the faster-growth areas, are left not only poorer but without official guidance on their future fiscal organization. On the other hand, their straitened circumstances have required immediate action.

The Current Fiscal Response. Cities and the county are taking a number of steps to bring their costs into line with their current revenue streams. Among these are the following.

Annexation Policies. The City of Boise is looking much harder at annexations before proceeding with them, this caution stemming from the city's limited ability to extend services to new areas. While Eagle is still considering annexations (the Middlebrook annexation in particular), the development process is to be structured in phases to permit the city flexibility to adjust later phases in the event circumstances (such as service capacities) alter in the meantime. Ada County, for its part, is giving increasing weight to the desirability of ensuring that new urban scale development take place within municipal contexts rather than in unincorporated areas - a step which should reduce the county's service responsibilities to such areas over time.

Cost Reductions. The most common cost reduction strategies, which all three agencies are pursuing to some extent, are (1) reducing personnel costs, (2) eliminating capital facilities expenditures to those financed wholly by federal funds and (3) reducing maintenance expenditures. Boise offered several specific examples. The city's permanent staff has dropped from 1,100 to about 700. (This drop has been accomplished both by attrition and by a layoff of 258 staff members, including 22 firemen.) Certain services are being spread more thinly or discontinued altogether. Some examples: grass cutting in public green spaces is being reduced, the smaller contribution to the Humane Society is increasing the dog population of the city (and concomitantly reduced animal enforcement is reducing dog license revenues), the diets of the zoo animals are being reviewed to determine what cost savings are possible, and the weed control ordinance has been repealed. Not all of these reduced services meet public approval, but the city feels it must make these and comparable changes to keep costs and revenues balanced. The representatives of each of the three governments generally echo the view that the voters seem to want cuts only in those services which do not affect them - but as every service benefits somebody, no cuts can be completely painless.

The maintenance reduction is particularly worrisome to public finance personnel, who feel that this strategy simply builds up major public facility expenditure needs sooner than would be required if ongoing maintenance could be kept at its past levels.

Re-examination of Local Government's Public Service Role. The irony of Initiative No. 1 is that it cuts back on the resources of that level of government which had been thought to be most readily responsive to the electorate, while it does nothing to reduce the spending or the obtrusiveness of the state and federal governments. But local governments must respond to the mandate to limit their roles, and one likely target for reduction is services not mandated (or reimbursed) by federal or state requirements. Emergency medical services provides a good example in Ada County. Public transportation, too, is a service Boise provides (partly under pressure from the federal government stemming from air quality considerations) which is presently not mandated and is heavily subsidized.

Hidden Costs. One of the concerns local governments express is that of being able to cope with sudden expenses, or with long-term costs of public improvements not now being undertaken. The recent problems faced by many Pacific Northwest communities in cleaning up in the aftermath of Mount St. Helens ash fallout provides an excellent example of public costs that cannot readily be foreseen but must be dealt with on a crisis basis. An example of the second kind of problem is surface water drainage, a need not being addressed on a coordinated basis in Ada County at present. Costs of coping with this problem, which is particularly acute in the area to the southwest of the City of Boise, may well exceed the $20,000,000 level. Such costs of "new" services will be difficult for existing governments to absorb under current strapped fiscal conditions.

Need for Action. Public officials of all three jurisdictions - Boise, Eagle, and Ada County - agree on the importance of responding to the property tax limitation initiative in a manner that will permit restoration of adequate levels of public services. Although the approaches which at present seem most appealing differ among jurisdictions, there is agreement on the desirability of coping responsibly with future needs so as to allow a resumption of regional growth along the lines desired in each community.

Local governments are particularly concerned about some of the adverse impacts that may result from Initiative No. 1. Among these are the loss to public agencies of good staff people who may resign if they feel long term opportunities are better elsewhere. Another is the concern that a decline in public service levels could prove a disincentive to firms to locate in the region. In particular, high technology firms that consider a number of regions when locating a new plant are known to be particularly sensitive to the quality of the educational system locally, as their highly-trained professional and technical people insist upon this feature in deciding whether to accept assignment to new locations. So if the Boise area is to continue to move in the direction of diversifying and strengthening its economic base by adding clean industry of this kind, there is a limit to the extent of cost-cutting in public services that can be accommodated consistent with economic development objectives.

These kinds of concerns have motivated local government to look beyond the current problems of coping with the Initiative One aftermath to future questions of efficiency and productivity in service delivery and long run solutions to revenue problems.

Fiscal Prospects: The Long-Run Picture

Although public service finance in the Boise region faces definite current difficulties, most observers from all three jurisdictions see some positive outcomes of Initiative One and point to a number of future actions to relieve the current crisis and put local general purpose governments on a firmer footing.

Stabilizing Revenues. Although, unless there is a two-thirds override of the property tax limitation, it appears that public revenues from that source will provide a decreasing proportion of local government revenues as time goes on, other sources of revenue have been identified and will eventually be tapped. Among those specifically mentioned by local agencies are general obligation bonds (exempt from the provisions of the Initiative), special purpose bonds, such as for industrial development and housing finance (require state enabling legislation but are common in other states), local option taxes and state payments in lieu of taxes. The latter revenue source would be of particular assistance to the City of Boise, which hosts the state government and has within its municipal boundaries a considerable amount of state property not subject to property tax though eligible for city services.

All jurisdictions are looking to imposition of user charges (authorized by state legislation) and imposition or increases in fees wherever possible. Ada County in particular has been considering growth management fees in line with a study the Ada Planning Association Board commissioned with funds from the Pacific Northwest Regional Commission. Although the methodology of that study has been criticized by some readers, there is general agreement that under current fiscal conditions some residential development probably does not "pay its own way"; the main arguments lie in (1) whether a growth management fee - a fee to cover the capital costs of future public services - is the proper response to this situation, and (2) how to allocate capital costs among various types of land use.

Using other states' experience as an indicator, certain fees (such as for school site dedication and park dedication) have been upheld by the courts and are in widespread use, and the principle is certainly readily applicable to such other services as fire and police. Even its advocates recognize, however, that this approach covers only capital facilities, leaving open the question of the ongoing financing of operating costs. And if payment of such fees is required to precede issuance of permits, the magnitude of the charges may well be sufficient to deter some development.

Administrative Remedies.

Solving the Apportionment Problem. A problem discussed earlier is that of imposing the maximum one percent property tax rate in all tax code areas, which is not possible currently due to discontiguity among taxing districts. This problem could be solved (as California has solved it) by imposing the one percent tax on a county-wide basis and then apportioning the revenues among taxing districts. Thus far, the legislature has not proposed this approach, and county commissioners (who are familiar with county budgets but are certainly much less familiar with the problems of the special districts) have not been willing to take aggressive action in this direction. Although the situation appears currently to be at an impasse, most observers feel that a solution to the problem will eventually be hammered out - if only because, in the interim, tax revenues are going to fall far short of the permitted one percent level in most areas of most counties. So there is a powerful impetus for solving this problem.

District Consolidation. The apportionment problem has called public attention to the number of special purpose taxing districts in Ada County, and the general feeling is that the number (around 50) is excessive. Economies of operation may well be possible if certain districts are consolidated. Such consolidation can take place either on a functional basis (i.e., several fire districts merging into one) or on a geographic basis (fire, open space, wastewater service to a given area provided by a single district - just as city governments generally operate). Both of these kinds of consolidation are being widely studied in California for the same reasons (economy and increased efficiency) they are being proposed in Idaho. The chief impediment seems to be that the special districts, with elected boards, do offer valuable opportunities to area residents for public involvement which would be reduced if the number of such districts were cut back. But the benefits of the approach are such that movement in this direction is a realistic expectation.

In the meantime, an interim measure could be the discouragement of new district formation. This appears to be the point of view of Ada County at present. The Middlebrook controversy has drawn attention to the potential problems that may arise when a city is empowered to approve an annexation and subsequent development project the principal services to which are the responsibility of other entities.

More Comprehensive Financial Planning. The current fiscal crisis has drawn attention to the need for more thorough-going and long-run analysis of public finance requirements, which has spurred Boise in particular to begin to look at long-term financial planning as an important aspect of municipal finance. This kind of planning is seen as integrated with long-term development planning in a coordinated package to make public actions more efficient and consistent. Boise has also been working with a group of private-sector financial experts to improve the operation of financial planning and reporting systems, and is establishing data processing techniques to improve the capability, speed and accuracy of financial reporting systems.

Going Private. As mentioned earlier, there are a number of utilities or services that can be (and frequently are) performed by private entities rather than by public agencies. These include water (which in rural Ada County is generally provided by on-site wells or private services) and solid waste disposal (where householders may be individually responsible for hauling their own refuse to a dump site or for contracting with a private firm to provide this service - the City of Boise recently made mandatory household trash collection by a private service).

If the costs of providing a public service system appeared prohibitive, it might be possible in some cases simply to put the responsibility for providing that service on the individual householder. There are a number of kinds of arrangements for accomplishing this approach. Often, homeowners' associations in new subdivisions can take responsibility for such functions as landscape maintenance and weed control, pest control (functioning as mosquito abatement districts), surface water drainage, street and street lighting maintenance, and so forth. This approach relieves the public sector of financial responsibilities, and gives the appearance of making new development less costly to the public.

However, the approach doesn't make development less expensive for the new home buyer, who is paying the homeowners' association for the same services he might otherwise have been paying some public entity for, and the resident may actually end up paying more to the extent that public agencies can finance long term improvements in a less costly manner (i.e., through bonds) than private developers can. Furthermore, there has been concern expressed in other states where this approach is more widespread that these "private" responsibilities would devolve upon the public in any case should a homeowners' association go into default.

Less structured private systems, such as on-site wells and on-site septic systems, are often possible where densities are low and these approaches, too, initially look less costly from the point of view of the public treasury. But cost savings of this kind may well be offset by cost increases in other functions: more miles of roads are needed to serve dispersed development, more travel by school buses to bring children to schools, and so forth. Thus, private service provision must be thoroughly analyzed before it can be concluded, on balance, to be cheaper than the public alternative.

Land Use Planning Responses.

Tying New Development to Existing Infrastructure. The high cost of new service extensions has called attention to the advantages of utilizing existing infrastructure to accommodate new development. Such an approach reduces the commitment of capital required to serve new growth while it offers the advantage of reducing average costs of those already served by an existing system that is operating at less than capacity.

Contiguous Development. A second way in which fiscal constraints can alter land use planning is by pointing up the advantages of contiguous development. If new development abuts existing development, costs of service extension are generally less than they would be if the newly-developing area were separated from the urban boundary by vacant or undeveloped land.

Cautious Approach to Annexation. Recognizing the lower level of financial resources available, cities may well resist annexation proposals that in the past would have been almost routinely approved. The property tax limitation initiative, in Idaho as in California, has tended to change the outlook toward annexation of both annexors and annexees. Before the initiatives, unincorporated areas often resisted annexation because their tax rates would rise; now, with tax rates more or less equalized between incorporated and unincorporated areas, this source of resistance has been greatly reduced or altogether eliminated. On the other hand, cities which in pre-initiative days considered annexations desirable because of additions to the property tax base have found that benefit much reduced, and are often legitimately concerned that the increase in property tax revenues resulting from annexation will not compensate for additions to service costs. It is for these reasons that Boise is currently discouraging annexation proposals.

Development Phasing. The fiscal constraints local governments are now experiencing also make them more cautious about giving approvals to long-term development projects, because the service and fiscal conditions that apply when such projects begin may no longer obtain by the time of their completion. Furthermore, there are clear advantages in maintaining ongoing approval authority of large projects in the event of delays in completion, changes in ownership or management, or other conditions that might result in an alteration in the developer's intentions or objectives.

An example of the kind of project expected to be subject to approval by phases is Middlebrook. Phased approvals have been used by the City of Eagle on earlier projects, and this approach can be expected to be used more extensively by Idaho jurisdictions generally as long as the current fiscal crisis lasts.

Area Summary

City of Boise. Boise has felt the impact of Initiative One more severely than other jurisdictions because it operates on an accrual basis and because its property had already been revalued up to near the state-mandated limit at the time the Initiative passed. That the reduction in revenues has caused severe short-term problems is unquestioned. However, the long-term outlook is not bleak. Certain additional sources of revenues seem likely to be tapped in the future and Boise will likely continue to receive more state and federal funds, as a proportion of its budget, than do the other general purpose governments reviewed.

The fiscal crunch has underlined the practicality of some of Boise's planning policies, particularly the preference for infill development in the southeast and (to a lesser extent) the northwest. This growth corridor is the most easily serviced by municipal agencies and in many cases the infrastructure to support new development in these areas is already in place. Growth in the outlying areas will be more closely scrutinized in the future, with fewer annexations, preference given to contiguous development, and a close tie-in between long-term physical development planning and capital improvement planning to assure efficiency and minimum public cost.

City of Eagle. Eagle is still a comparatively small town, with a preliminary 1980 population of approximately 2,600 (a substantial increase over the population at 1971 incorporation of less than 400). The urban service planning area of the town, which is delineated in the Ada County Comprehensive Plan, is expected to see steady growth over the next decades, bringing the future population of the community to over 13,000 as indicated in APA Board-adopted subarea population allocation.

The growth of the community is not expected to abate much as a result of current fiscal problems because the current scale of operation of the City of Eagle is quite modest and no immediate change in this characteristic is expected. One of the city's sources of appeal for new residents is reportedly its small town character and the direct accessibility of its government. While this can be expected eventually to change as the local population increases, the present structure of urban service provision - most services are provided by special districts - insulates the city somewhat from the more severe effect of Initiative One noted elsewhere. The concern about Eagle's growth often expressed in the region relates more to regional planning questions than directly to fiscal capacity, although the special districts providing services to parts of Eagle City may encounter their own fiscal problems in extending services, and that has not been explored in the course of this qualitative review.

County of Ada. Ada County revenues have fallen short of earlier expectations because of Initiative One and lower construction activity (which has reduced fee revenues). The county has responded by trimming staff and services where possible. If the current crisis is prolonged, a reduction in nonmandated services is a reasonable expectation.

Looking beyond the immediate future, it appears that the county, like the City of Boise, will be affected by fiscal constraints in terms of its future development policies. This has already been happening to some extent, but the revenue reduction has given this direction greater impetus. There will be a reluctance to permit discontiguous development, a closer evaluation of the public costs of new development, and more assiduous observation of a policy to encourage new development to annex to existing municipalities and to obtain city - rather than special district - services. In general terms, the philosophy of the county will increasingly be to support municipal growth while unincorporated lands would be retained in rural uses. The implications of this approach in terms of the spatial distribution of growth are plain. Whether such a policy would also serve to inhibit growth is less clear.

The Southwest Area. Initiative One has been one important factor influencing the recent reassessment of future growth in the Southwest area. The cost of providing urban services to the dispersed developments that currently characterize the area, has proven to be higher than anticipated. These costs have contributed to the community's resistance to construction of public wastewater facilities.

The Southwest area is located in the unincorporated county and is served by a number of special service districts. As a result, the fiscal outlook for the Southwest area is difficult to assess. It does appear, however, that the combination of lower property tax revenues and an increasing awareness of the cost of urban services will result in slower growth than anticipated, at least in the near term.

Conclusions

Although this investigation has been qualitative and no forecast of long-term public costs or revenues has been undertaken, it seems clear from the review completed that current fiscal problems are causing a reassessment of growth and planning policies in many of Ada County's jurisdictions.

While local officials believe the resources will be available to accommodate future growth, that growth is probably more likely to be concentrated in or adjacent to existing urban communities than might have been expected a few years ago, with this pattern of concentration helping to assure efficiency in urban service delivery and minimum average cost. The current recession in the economy, which has been evidenced in part by the downturn in new construction, has given local communities some breathing time to adjust their planning, development and fiscal policies in response to the new fiscal constraints they face.

An unanswered question is whether the mechanisms for guiding growth are strong and consistent enough to achieve the stated policies of Ada County and the City of Boise. Development of outlying areas is limited under county zoning to essentially agricultural use (1 unit per 80 acres in agricultural use areas and 1 unit per 160 acres in rangeland areas) except that smaller parcels are allowed where there is no water available for irrigation (1 unit per 40 acres) or in approved subdivisions. How many undeveloped parcels exist in the latter is not known, but no new subdivisions in the rural areas have been authorized since 1977. Given this zoning pattern it does not presently appear likely that more restrictive development policies within and at the edges of urban areas would cause much rural spillover development outside the Southwest area.

However, a more substantial issue is the resilience of the regional economy itself if housing prices continue to rise in response to scarcity, and housing price, type and locational availability pose disincentives to people considering moving into the region. If events take that direction, there will be more pressure on local public agencies to facilitate development through both fiscal and planning policies.

Chapter 9

AIR QUALITY

Introduction

Terminology

Any discussion of air pollution issues requires an understanding of terms and phrases which have a technical meaning in the context of air pollution discussions. It is especially important to understand the distinction between air pollutant emissions and ambient air quality. The term "pollutant emissions" refers to the amount (usually stated as a weight) of one or more specific compounds introduced into the atmosphere by a given source or group of sources. The term "ambient air quality" refers to the atmospheric concentration (amount in a specified volume of air) of a specific compound actually experienced at a particular geographic location (which may be well removed from the location of relevant emission sources). Measured ambient air quality levels are determined by: the location of emission sources; the types and amounts of pollutants emitted; the physical processes (meteorology) affecting the distribution, dilution, and removal of these pollutants from the area of concern; and chemical reactions which transform pollutant emissions into other chemical substances and sometimes generate other pollutants from normal atmospheric constituents.

Air pollutants are often characterized as being "primary" or "secondary" pollutants. Primary pollutants are those which are emitted directly into the atmosphere (e.g., carbon monoxide, nitric oxide, hydrogen sulfide, sulfur dioxide, many types of particulates, and many types of organic compounds, etc). Secondary pollutants are those which are formed through chemical reactions in the atmosphere (e.g., ozone, nitrogen dioxide, sulfuric acid, sulfate and nitrate particulates, etc.). These chemical reactions usually involve primary pollutants, normal constituents of the atmosphere, and sometimes other secondary pollutants.

The distinction between primary and secondary pollutants is more than a matter of semantics; important air quality management implications are also involved. The ambient concentration of primary pollutants depends on the concentration and strength of emission sources, and the degree to which emissions are dispersed or removed from the atmosphere between the emission source and the ambient air quality monitoring instrument. Thus, air quality problems involving primary pollutants can usually be traced to a single pollutant source (or concentrated group of sources) emitting large quantities of the pollutant of concern. When an air quality problem involves a secondary pollutant, however, the relationship of emission sources to air quality problems becomes much more complicated. Because secondary pollutants are not emitted directly into the atmosphere, observed ambient concentrations may not show much correlation with the concentration of precursor emission sources. The time factor involved in the chemical reactions producing secondary pollutants allows emissions from numerous sources to become dispersed and mixed together. As a result, the observed ambient pollutant concentrations are due more to the cumulative areawide mass emissions of precursors than to the spatial concentration of emission sources.

Meteorological Factors

Meteorological factors are important to consider from several perspectives when evaluating air quality issues. Factors such as temperature, humidity, and the intensity and duration of sunlight play important roles in governing the nature and rate of chemical reactions in the atmosphere. Atmospheric turbulence, wind patterns and vertical temperature gradients are important factors governing the distribution and dispersion of pollutants. Atmospheric turbulence, wind patterns and precipitation processes affect the rate at which pollutants are removed from the atmosphere.

Topographic Effects.

Topographic conditions exert considerable influence over local meteorological conditions. Surface winds are deflected and channeled by terrain features, resulting in air flow patterns at ground level which may be quite different from the prevailing winds at higher altitudes. In areas of rugged terrain, slope and exposure greatly influence microclimatic conditions. In such areas, daytime heating of mountain slopes can lead to a gentle upslope breeze. Conversely, nighttime radiational cooling of the slope will produce a layer of cold air next to the ground, resulting in a downslope drainage flow of cold air. These localized upslope and downslope flows are sometimes called valley and mountain winds.

Atmospheric Stability and Temperature Inversions.

The topic of atmospheric stability centers on processes which produce or resist vertical motions in the atmosphere. On a microscale level, vertical motions are predominantly a result of mechanical turbulence due to wind flow across non-uniform surface features. On a larger scale, vertical temperature differences within an air column become the major consideration. Because atmospheric pressure decreases with altitude, there is also a natural tendency in the lower atmosphere for temperature to decrease with altitude.

An air parcel can be heated by contact with a warmer surface, absorption of sunlight or infrared radiation, or through heat released by condensation of liquids within the air mass. If the air near ground level is heated sufficiently, a pocket or "cell" of warmed air will expand and rise, being displaced by cooler, denser air from above. As it rises, the cell of warm air will expand further due to decreasing atmospheric pressure, causing the temperature of the air cell to drop. The air cell will continue to rise, expand in volume, and cool until it reaches an altitude where it is at the same temperature and pressure as surrounding air masses. This rising of warmed air and replacement of cooler air from above results in vertical mixing of the air column. This type of vertical instability occurs when air at ground level is significantly warmer than the air aloft. If the air at ground level is only a little warmer than the air aloft, air parcels will neither rise nor sink, and "neutral stability" conditions will exist.

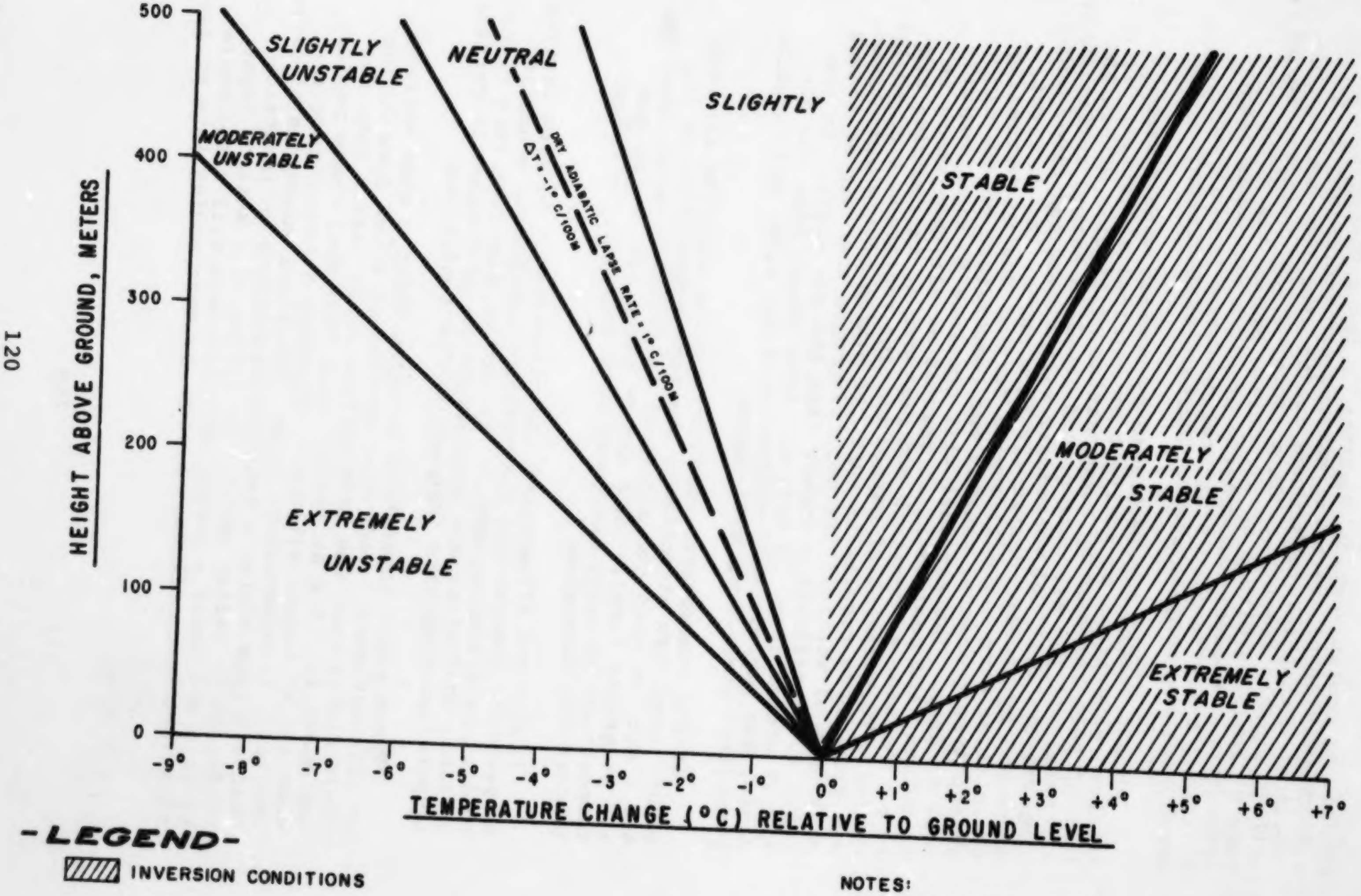
Stable atmospheric conditions occur when the air near ground level has essentially the same temperature as the air aloft, or when the air aloft is actually warmer than the air at ground level. This latter situation, where air temperature actually increases with altitude, is called a temperature inversion.

Figure 9-1 illustrates the relationship between vertical temperature changes and the various atmospheric stability conditions discussed above. As can be seen from this figure, unstable conditions are more sensitive to changes in vertical temperature gradients than are stable conditions.

Temperature inversions can form under a wide variety of circumstances. Radiation inversions often form during clear nights when the land surface cools faster than the air above it. Air at ground level thus cools more rapidly than air at higher altitudes, creating a temperature inversion. In mountainous areas, downslope movements of dense, cold air from higher elevations can create an inversion condition in valley areas. An influx of a shallow layer of cold air under a larger warm air mass will also create an inversion condition. A warm air mass moving into an area

FIGURE 9-1

RELATIONSHIP BETWEEN ATMOSPHERIC STABILITY AND INVERSION CONDITIONS



Source: Jones & Stokes Associates, Inc.

NOTES:

- DIVISIONS BETWEEN STABILITY CATEGORIES ARE SHOWN MORE FOR SCHEMATIC PURPOSES THAN FOR PRECISE GUIDELINES.
- CHANGE OF 1°C.= CHANGE OF 1.8° F.
- 100 METERS = 328 FEET

above a cold air mass at ground level can also create inversion conditions. A subsidence inversion forms when a large mass of air within a stagnant high pressure system sinks down over an area and is warmed by compression to a temperature higher than that of the surface air mass. This occurs because, as air from the center of a high pressure area spreads outward, it is replaced by a sinking air mass from above.

Radiation inversions and inversions formed by cold air drainage usually occur at or near ground level. Subsidence inversions usually form at higher altitudes above the ground. Both surface and elevated inversion layers may be present simultaneously. Surface inversions tend to break with normal daytime heating of the land while inversions aloft tend to be more persistent.

It should also be noted that cloud cover reduces daytime heating of the ground and traps nighttime heat radiation from the ground, thus favoring neutral stability conditions. Strong winds result in turbulent mixing of the lower atmosphere, thus suppressing both the heating and cooling of surface air parcels; this again promotes neutral stability conditions (though adding mechanical turbulence).

The presence of snow cover or frozen ground conditions can greatly influence the persistence of ground level inversions. Snow cover reflects sunlight, resulting in reduced heating of land surfaces. Frozen ground will absorb sunlight and warm when temperatures are below freezing. As the ground temperature approaches 32°F, the heat energy in sunlight will be expended in thawing the soil with little actual change in soil temperature. Thus, both snow cover and frozen ground conditions can inhibit the processes which weaken and destroy ground level inversions.

Temperature Inversions in the Boise Area

The intensity of low level temperature inversions in Boise was investigated during the early part of 1980. The full report from this study (North American Weather Consultants 1980) is available in EPA's Boise operations office. An instrumented balloon attached to a wire cable was used to determine vertical temperature profiles at Ann Morrison Park. Over half of the attempted balloon launchings had to be cancelled due to high winds and storms. Data from 8 days with successful operations are summarized in Table 9-1.

The North American Weather Service study compared data collected at Ann Morrison Park with data from the Boise municipal airport. Wind speeds and directions at Ann Morrison

Table 9-1. Summary of Vertical Stability From Tethersonde Study

Height Interval	Monday 1-21-80 11:16 AM	Monday 1-21-80 4:15 PM	Tuesday 1-22-80 9:15 AM	Tuesday 1-22-80 12:45 PM	Wednesday 1-23-80 10:00 AM	Wednesday 1-23-80 3:50 PM	Friday 2-8-80 9:51 AM	Friday 2-8-80 1:00 PM	Saturday 2-9-80 9:00 AM	Saturday 2-9-80 Noon	Saturday 2-9-80 4:12 PM	Sunday 2-10-80 8:45 AM	Sunday 2-10-80 Noon	Sunday 2-10-80 4:15 PM	Monday 2-11-80* 8:45 AM	Monday 2-11-80* Noon	Monday 2-11-80* 4:15 PM	Tuesday 2-12-80 8:45 AM	Tuesday 2-12-80 Noon	Tuesday 2-12-80 4:15 PM
Surface - 100'	A	A	D	B	D	A	E	A	A	F	E	G	F	A	F	F	A	A	A	A
100'-200'	F	E	D	A	E	B	E	F	A	A	A	C	A	A	E	A	A	E	D	A
200'-300'	F	G	D	D	D	E	E	A	G	F	B	F	B	A	D	A	A	E	A	E
300'-400'	G	A	E	B	E	C	E	G	F	E	A	A	F	A	D	F	A	G	G	E
400'-500'	G	D	D	D	D	F	D	G	A	E	B	A	E	D	E	B	B	G	A	A
500'-600'		E	E	F		E	B		D	E	E			A	A	E	D	E	A	B
600'-700'		A		A					E						E	E	D	G	B	D
700'-800'																		A		A
800'-900'																		A		
Surface Temperature	37.5°	39.2°	23.9°	32.0°	32.0°	37.0°	31.0°	45.0°	28.0°	43.0°	48.5°	26.0°	41.0°	43.0°	27.0°	42.0°	45.0°	26.0°	37.0°	40.0°
Surface Wind Speed (mph)	2.0	0.5	1.0	2.0	3.0	4.0	4.0	8.0	1.5	6.0	5.0	1.0	2.0	3.0	1.5	4.0	5.0	2.0	4.0	6.0

Stability Class A = Extremely Unstable
B = Moderately Unstable
C = Slightly Unstable
D = Neutral
E = Slightly Stable
F = Moderately Stable
G = Extremely Stable

*8-hour carbon monoxide level at 9th Street monitor was 9.6 ppm for 6 am-2 pm period.

DATA SOURCE: North American Weather Consultants 1980.

Park were not well correlated with those at the airport. Data on atmospheric stability at Ann Morrison Park were much more detailed than available data from the airport. The special study data show a complex pattern of low level stability conditions not detectable from data collected at the airport.

Existing Air Quality Problems

Initial air quality monitoring in 1974 identified carbon monoxide (CO) as the major urban source pollutant of concern in the Boise area. The Idaho Air Quality Bureau operates two permanent CO monitoring stations which provide continuous monitoring data. The Idaho Transportation Department operates a third continuous monitoring station at its State Street offices. There have also been three special CO monitoring programs which provide additional data on the nature and extent of CO problems. There has been a limited amount of monitoring for other pollutants. Since data are limited for other pollutants, the focus of this chapter will be on CO.

EPA has established two sets of ambient air quality standards for CO. The standard for 1-hour exposures is currently 35 ppm (parts per million), to be exceeded no more than once per year at any air quality monitoring site. An additional standard has been set for 8-hour exposures. This standard (9 ppm averaged over a consecutive 8-hour period) is also to be exceeded no more than once per year. In practice, the 8-hour standard is more stringent than the current 1-hour standard. EPA has proposed changing the 1-hour standard to 25 ppm, but no final action has yet been taken.

Summary

Available monitoring data from several sources indicate that the Boise area experiences a geographically extensive pattern of high CO levels. These high CO levels are concentrated primarily along major traffic corridors. Under appropriate meteorological conditions (light winds and low level temperature inversions), air masses containing high CO levels can be transported more or less intact over distances of up to 1 mile. Thus, much of the Boise area is susceptible to episodes of high CO levels which originate primarily from major roadway corridors.

Episodes of high CO levels show a rather strong seasonal pattern, with most episodes occurring during the winter (November-February). There have, however, been instances of 8-hour CO levels above the federal standard during every month of the year and almost every possible 8-hour period of the day. The seasonality, frequency, and magnitude of CO episodes show significant yearly variation.

The valley and bench areas in Boise both experience severe CO episodes. The hourly patterns of high CO episodes in these two areas are rather distinctive. The bench area experiences a pattern of late night and early morning CO episodes seldom observed in the valley area. While differences in traffic patterns may play some role, meteorological factors appear to be a dominant influence. Topographic features suggest that nighttime ground level radiation inversions are frequent on the bench. The valley area, however, appears to experience cold air drainage flows which mix with or flush polluted air from the downtown area.

Appendix G provides a discussion of CO data collected by the various special studies and the permanent monitoring stations. These various data sources are briefly discussed below.

ESL/CH2M Hill Study

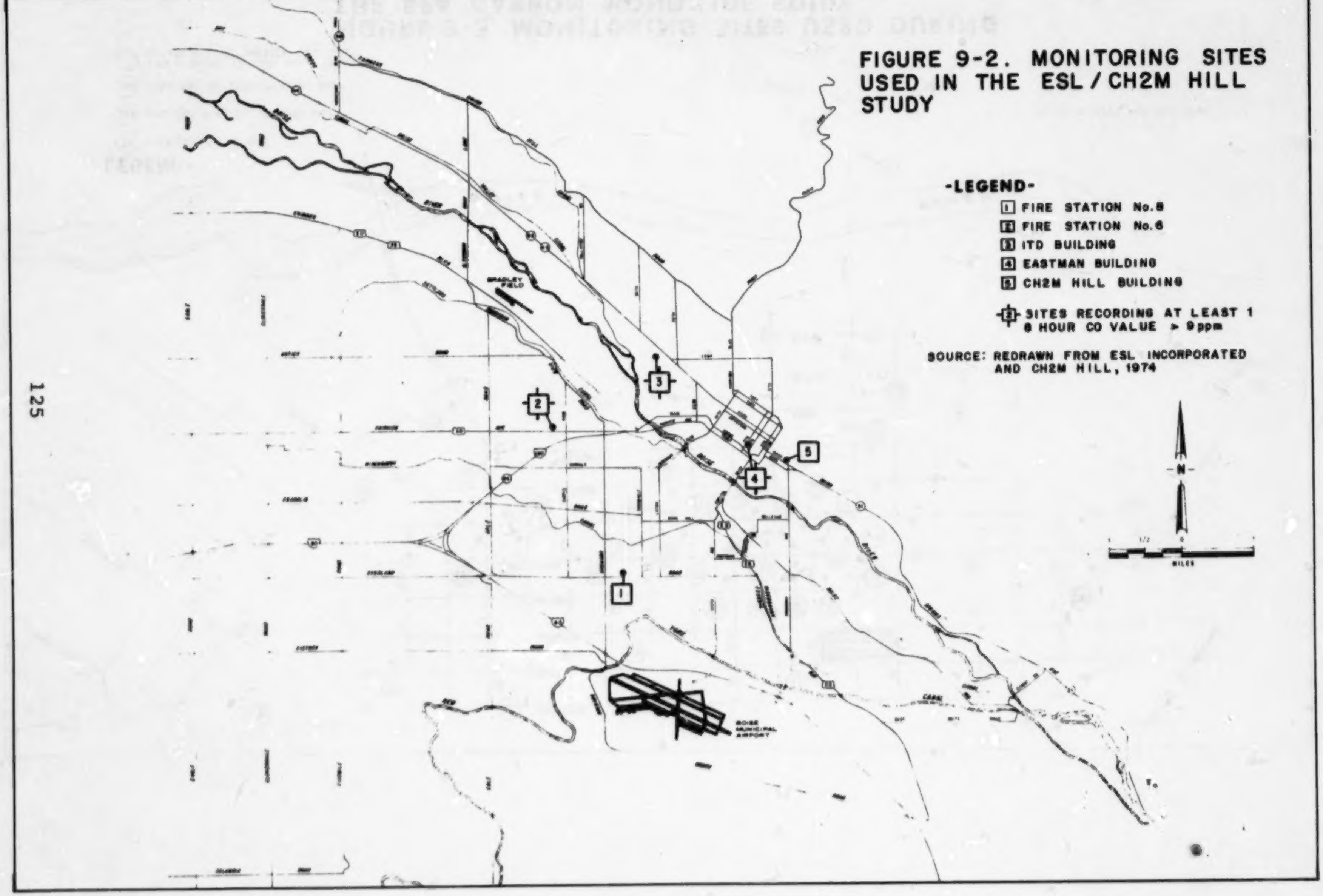
The first significant air quality monitoring program in the Boise area was conducted from January through May 1974. Monitoring site locations are shown in Figure 9-2. In addition to these monitoring stations, short-term bag sampling was conducted at street intersections near four of the five fixed stations. The federal 8-hour CO standard was exceeded at three of the five sites. The Eastman Building site regularly recorded monthly peak 8-hour average CO values of 12-20 ppm. None of the short-term bag sampling identified any violation of the federal 1-hour standard.

This study concluded that CO problems existed in the downtown Boise area, and at some more outlying areas. It was also concluded that areas on the first bench or higher locations generally comply with the federal CO standards.

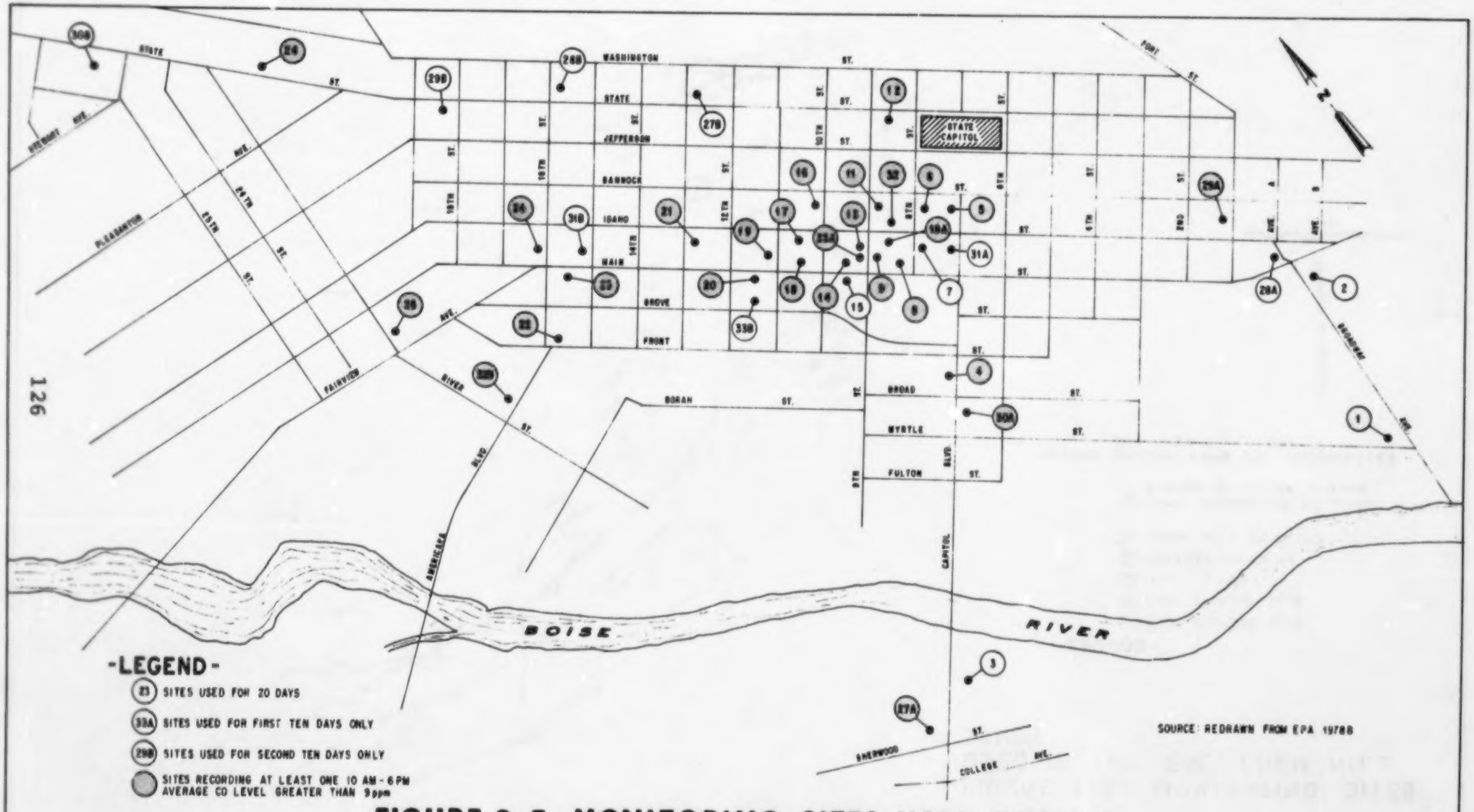
EPA Study

EPA sponsored a special CO monitoring study during late 1977. Four-hour bag samples were collected twice a day on weekdays between 10:00 a.m. and 6:00 p.m. Monitoring sites used in this study are shown in Figure 9-3. Site 13 was located adjacent to the Idaho Air Quality Bureau's downtown monitoring station. The peak 8-hour CO level measured during this study was 17.2 ppm at site 32.

FIGURE 9-2. MONITORING SITES USED IN THE ESL / CH2M HILL STUDY


-LEGEND-
1 FIRE STATION No.8
2 FIRE STATION No.6
3 ITD BUILDING
4 EASTMAN BUILDING
5 CH2M HILL BUILDING
SITES RECORDING AT LEAST 1 8 HOUR CO VALUE > 9 ppm
BRADLEY FIELD
BOISE MUNICIPAL AIRPORT
CANAL
N
1/2
0
MILES

SOURCE: REDRAWN FROM ESL INCORPORATED AND CH2M HILL, 1974


N
-LEGEND-
23 SITES USED FOR 20 DAYS
33A SITES USED FOR FIRST TEN DAYS ONLY
29B SITES USED FOR SECOND TEN DAYS ONLY
SITES RECORDING AT LEAST ONE 10 AM - 6 PM AVERAGE CO LEVEL GREATER THAN 9ppm
STATE CAPITOL
WASHINGTON ST.
STATE ST.
JEFFERSON ST.
BANNOCK ST.
IDAHO ST.
MAIN ST.
GROVE ST.
FRONT ST.
BROAD ST.
MYRTLE ST.
FULTON ST.
BORAH ST.
CAPITOL BLVD.
FORT ST.
BROADWAY AVE.
AVE. A
AVE. B
2ND ST.
4TH ST.
6TH ST.
8TH ST.
9TH ST.
10TH ST.
12TH ST.
14TH ST.
16TH ST.
18TH ST.
25TH ST.
28TH ST.
FAIRVIEW AVE.
RIVER ST.
AMERICANA BLVD.
PLEASANTON AVE.
SHERWOOD ST.
COLLEGE AVE.
BOISE RIVER
1
2
3
4
5
6
7
8
9
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27A
27B
28A
28B
29A
29B
30A
30B
31A
31B
32
32B
33A
33B

SOURCE: REDRAWN FROM EPA 1978B

FIGURE 9-3. MONITORING SITES USED DURING THE EPA CARBON MONOXIDE STUDY

This study concluded that the state's permanent monitoring station on Ninth Street is generally representative of CO concentrations in downtown Boise, although the station underestimated the magnitude and frequency of elevated CO levels. For example, the permanent station recorded exceedences of the federal 8-hour CO standard on 47 percent of the study days. This is in contrast to one or more of the study sites recording exceedences on 95 percent of the days. The state's downtown monitoring station recorded an 8-hour CO level of 13.7 ppm at the time that EPA's site 32 station recorded the 17.2 ppm average noted above. On 19 of the 20 days in the study at least one of the EPA study sites had a 10:00 a.m. to 6:00 p.m. average CO level greater than the simultaneous reading at the state's Ninth Street monitoring station.

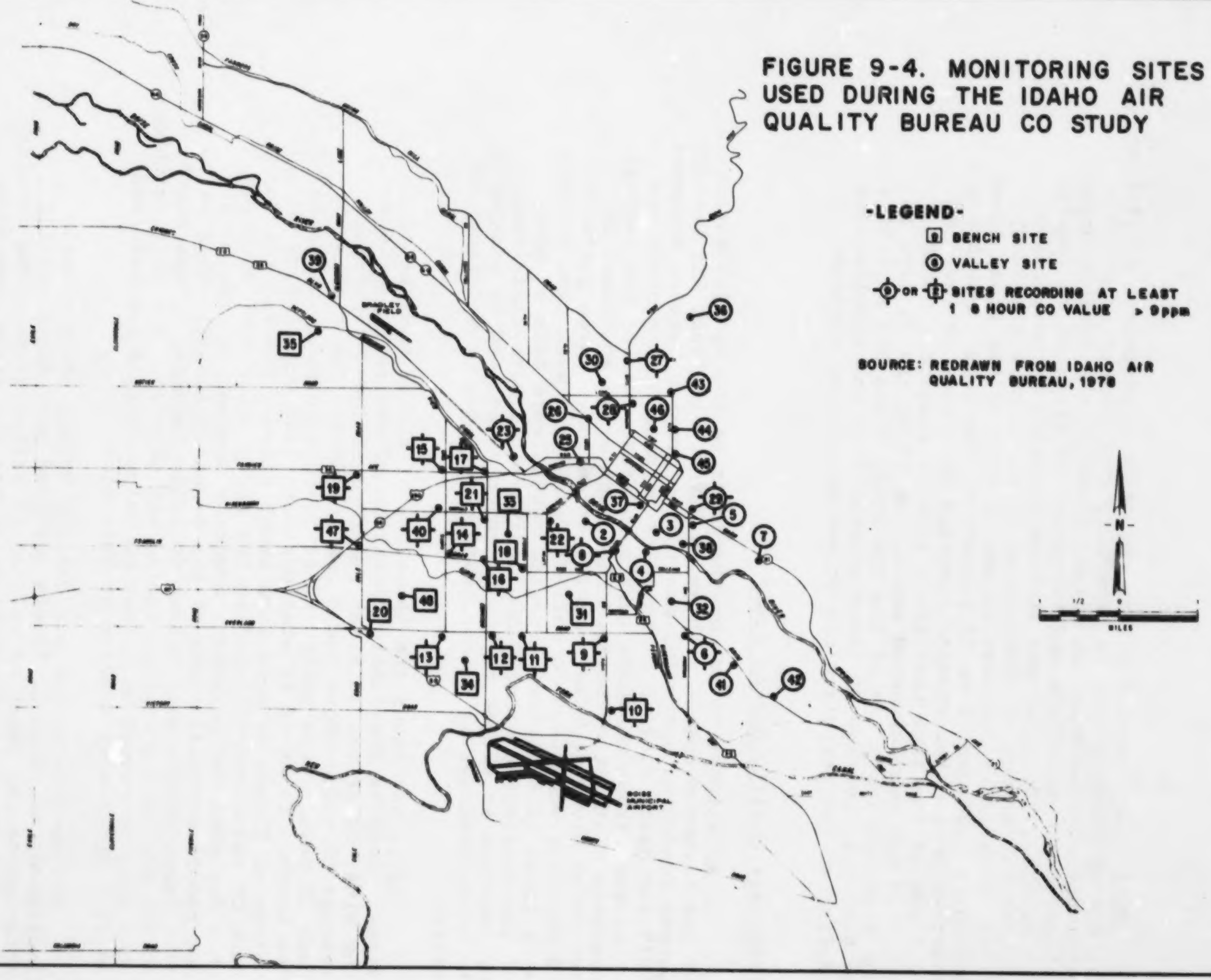
Idaho Air Quality Bureau Study

In an attempt to better characterize the spatial extent of the carbon monoxide problem in Boise, the Idaho Air Quality Bureau conducted a special monitoring program between November 7, 1977 and March 6, 1978. The major purpose of the study was to assess carbon monoxide levels in areas outside the central business district of Boise. The bench areas southwest of the Boise River received special attention. Three portable CO monitors were used to collect data for 1-week time periods at a total of 46 sites. Traffic counts were made at most of the monitoring sites. Monitoring sites were classified by location as either valley or bench sites, and by proximity to major roadways as either traffic corridor or neighborhood sites.

Figure 9-4 shows the locations of the 46 monitoring sites. Despite the limited duration of monitoring at any one site, 20 of the 46 sites recorded at least one 8-hour average CO value above the 9 ppm standard. The highest 8-hour CO values were monitored at traffic corridor sites on the bench. Eight of 10 stations reporting peak 8-hour CO values of 12 ppm or more were bench sites. The highest 8-hour CO value recorded during the study (25.0 ppm) occurred on a day when the permanent downtown monitoring station did not record any violations of the 8-hour standard. This value also exceeded the peak 8-hour CO value recorded by the Ninth Street monitoring station during all of 1978. The only neighborhood site to record an 8-hour CO value above 9 ppm recorded an 11.1 ppm 8-hour average at this time.

The results of the Air Quality Bureau study clearly indicated that high CO levels occurred near major traffic arteries on the bench as well as in valley areas. The results also confirmed the observations of the EPA study regarding the occurrence of high CO levels even when the Ninth Street monitoring station shows no violation of the federal 8-hour standard.

FIGURE 9-4. MONITORING SITES USED DURING THE IDAHO AIR QUALITY BUREAU CO STUDY


BRADLEY FIELD
BOISE MUNICIPAL AIRPORT
N
1/2
0
MILES
35
39
19
47
15
17
23
21
33
40
14
18
16
20
48
13
34
12
11
9
10
22
1
31
2
37
26
25
28
30
27
36
43
46
44
45
29
5
7
3
38
4
32
6
41
42

-LEGEND-
- ▢ BENCH SITE
- ○ VALLEY SITE
- ⌖ OR ⌖ SITES RECORDING AT LEAST 1 8 HOUR CO VALUE > 9ppm

SOURCE: REDRAWN FROM IDAHO AIR QUALITY BUREAU, 1978

Permanent Monitoring Station Data

The Idaho Air Quality Bureau currently operates two permanent monitoring stations in Boise. The downtown station (at the Odd Fellows Hall on Ninth Street, southwest of Idaho Street) has operated since July 1975. The Orchard Street station (south of Highway 55) has operated since May 1978.

Monitoring data from these two stations are presented in Appendix G. The downtown station has recorded 8-hour CO values as high as 20.4 ppm (in 1978) and 1-hour CO values as high as 40.9 ppm (1977). Violations of the federal 8-hour CO standard have been recorded on as many as 87 days during a single year (1976) at the downtown station. Peak CO values at the Orchard site are much lower (8-hour average of 12.8 ppm and 1-hour average of 29.5 ppm, both in 1979). Complete data for 1980 have not yet been reviewed.

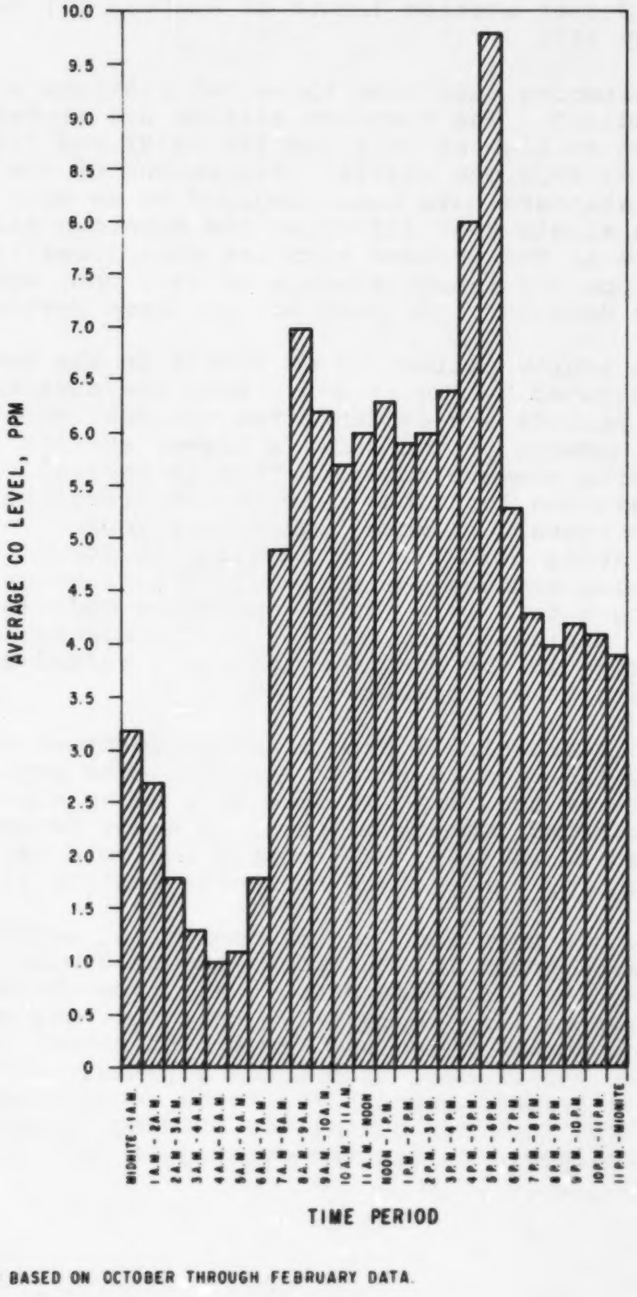
The hourly pattern of CO levels in the downtown area is illustrated by Figure 9-5. Both the morning and evening commute periods are evident from the monitoring data. The evening commute period shows a higher average CO value than the morning commute period. This is partially a reflection of the station location (near the intersection of two "outbound" streets). A more significant factor, however, involves the operating condition of cars in the location traffic flows. The evening commute period involves cars which are generally beginning a trip in a "cold" operating mode (with high emission rates). A significant portion of the morning commute traffic will arrive in the downtown area in a warmed-up operating mode (with lower emission rates).

An interesting contrast to the downtown station is provided by the Orchard Street station. The pattern of hourly CO levels at this site (Figure 9-6) shows a predominance of the morning commute pattern. A major factor here, as at the downtown site, is probably the cold vs. warmed-up conditions of vehicles in the local traffic flow.

The downtown and Orchard monitoring stations show distinctive patterns in the occurrence of 8-hour CO values exceeding the 9 ppm standard. Data from the downtown station are summarized in Figure 9-7. Most episodes occur during time periods which include the mid-afternoon and early evening periods. The Orchard site shows a pattern (Figure 9-8) which has two distinct periods of episode conditions. High CO levels tend to occur during the morning to early afternoon period and again during the evening to late nighttime period.

FIGURE 9-5

AVERAGE WINTER CARBON MONOXIDE LEVELS
AT THE BOISE ODD FELLOWS HALL MONITORING STATION

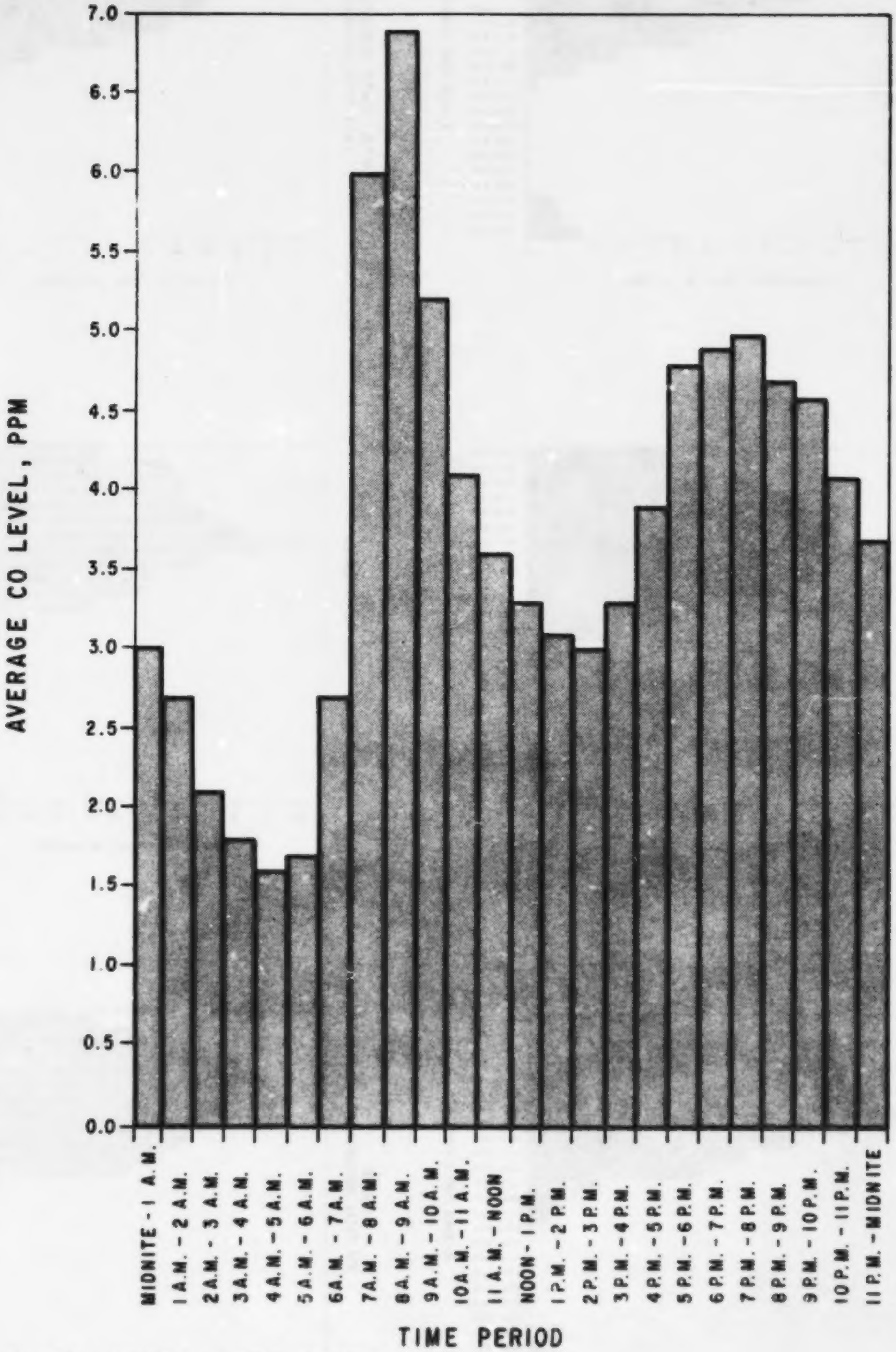


NOTE: BASED ON OCTOBER THROUGH FEBRUARY DATA.

DATA SOURCE: OCTOBER 1975 - FEBRUARY 1980 HOURLY
CO DATA FROM IDAHO AIR QUALITY
BUREAU.

FIGURE 9-6

AVERAGE WINTER CARBON MONOXIDE LEVELS AT THE CENTRAL DISTRICT HEALTH DEPARTMENT MONITORING STATION

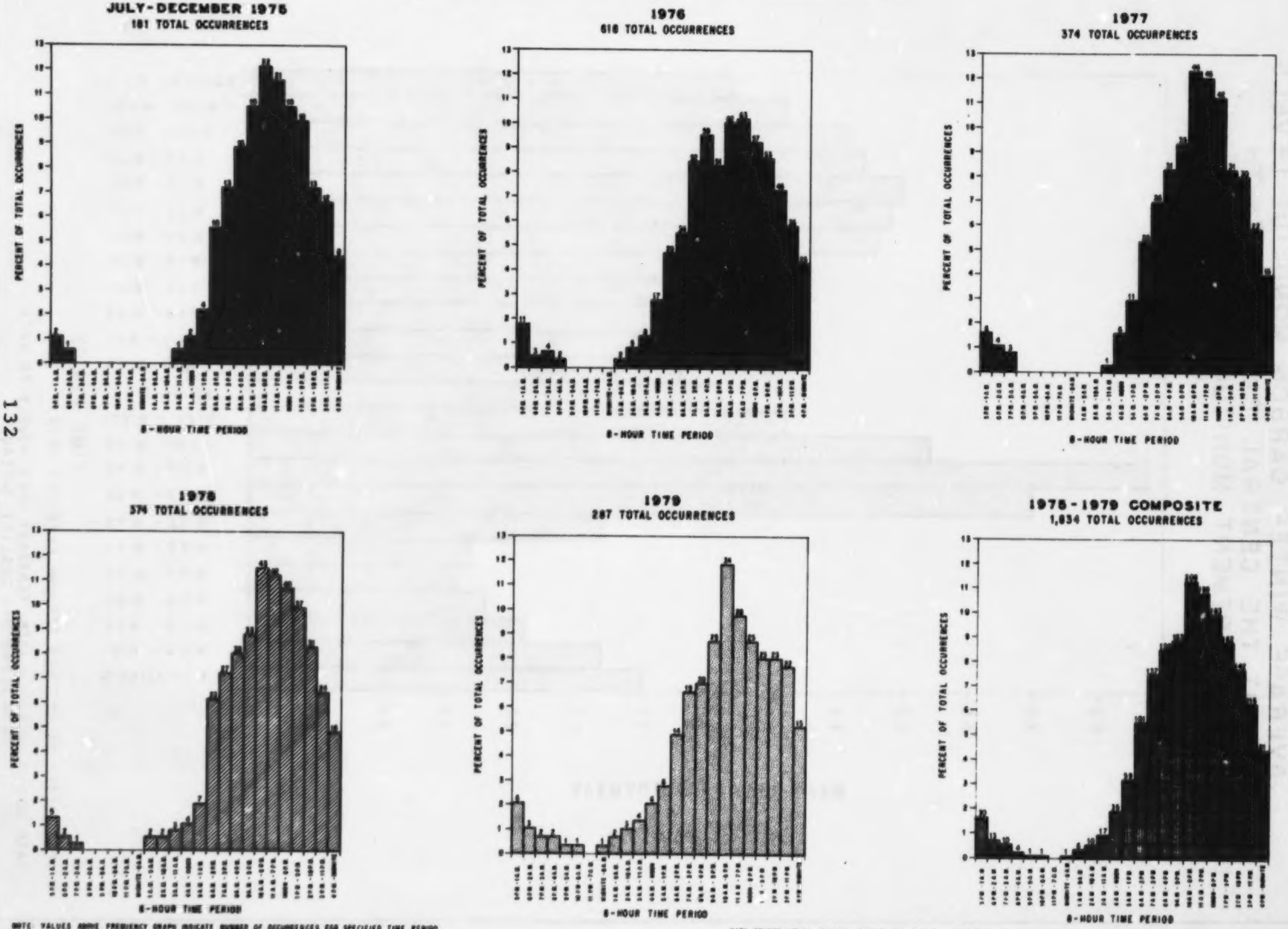


NOTE: BASED ON OCTOBER THROUGH FEBRUARY DATA.

DATA SOURCE: OCTOBER 1978 - FEBRUARY 1980 HOURLY CO DATA FROM IDAHO AIR QUALITY BUREAU.

FIGURE 9-7

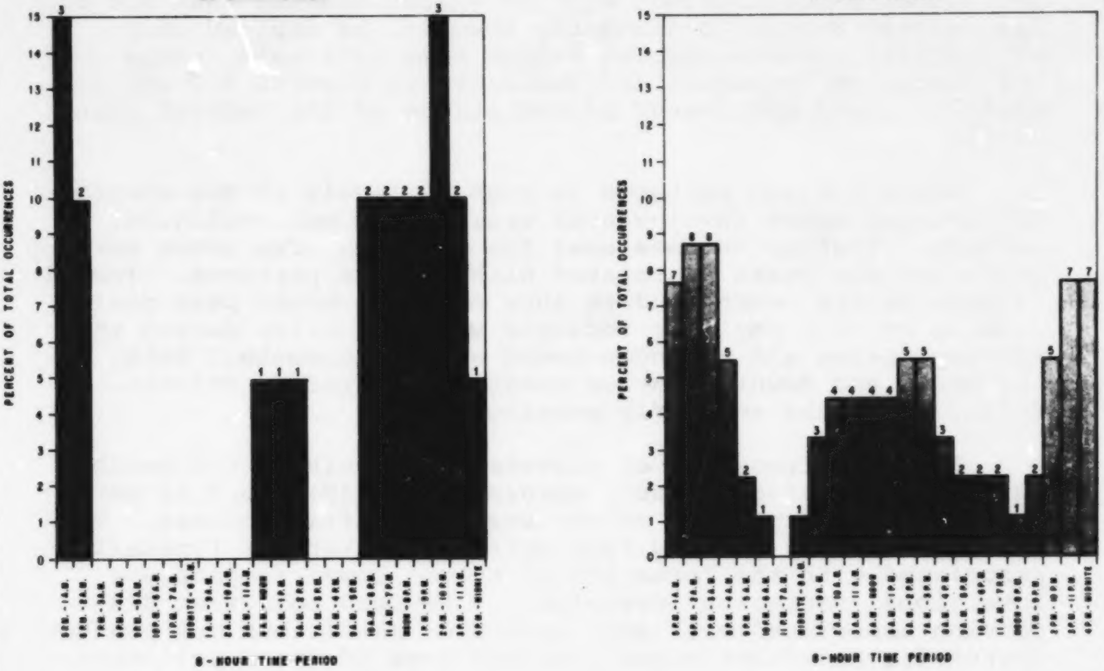
TIME PERIODS WITH 8-HOUR CO LEVELS > 9.0 PPM
AT THE BOISE ODD FELLOWS HALL MONITORING STATION



NOTE: VALUES ABOVE FREQUENCY GRAPH INDICATE NUMBER OF OCCURRENCES FOR SPECIFIED TIME PERIOD

DATA SOURCE: HOURLY CO DATA FROM IDAHO AIR QUALITY BUREAU

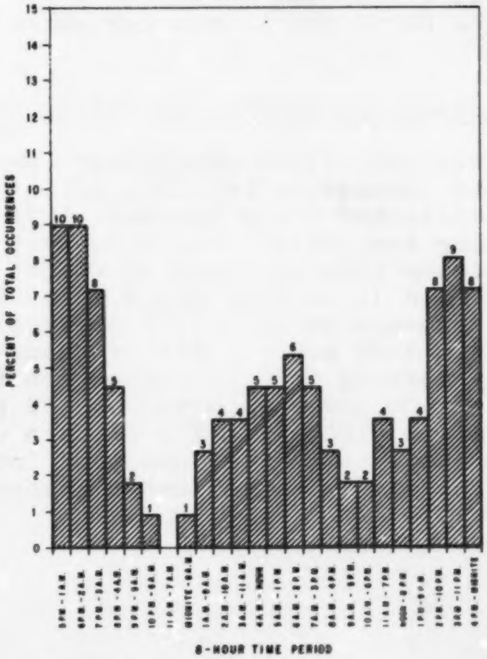
FIGURE 9-8
TIME PERIODS WITH 8-HOUR CO LEVELS >9.0 PPM AT CENTRAL DISTRICT HEALTH DEPARTMENT MONITORING STATION



MAY-DECEMBER 1978
20 OCCURRENCES

1979
92 OCCURRENCES

1978-1979 COMPOSITE
112 OCCURRENCES



NOTE: VALUES ABOVE FREQUENCY GRAPH INDICATE NUMBER OF OCCURRENCES FOR SPECIFIED TIME PERIOD.

DATA SOURCE: HOURLY CO DATA FROM IDAHO AIR QUALITY BUREAU

It should be noted that Figures 9-7 and 9-8 represent all individual 8-hour periods with CO values greater than 9.0 ppm. The federal 8-hour CO standard, however, is applied only to discrete, nonoverlapping 8-hour time intervals. Thus the number of "occurrences" indicated in Figures 9-7 and 9-8 greatly exceed the number of violations of the federal standard.

The different patterns in high CO levels at the downtown and Orchard sites involve both traffic and meteorological factors. Traffic volumes near the downtown area shows morning and afternoon peaks associated with commute patterns. Traffic volumes on the bench tend to show a single broad peak period from 11 am to 6 pm; this reflects shopping trips during the mid-day period and the home-bound evening commute. Both the bench and downtown areas exhibit low traffic volumes during the night and early morning hours.

The high frequency of elevated CO levels on the bench during the evening to early morning hours (Figure 9-8) corresponds with declining 8-hour average traffic volumes. The evening to early morning time period, however, is typically associated with the formation of ground level temperature inversions (radiation inversions). Reduced pollutant dispersion associated with such inversion conditions can produce increasing pollutant concentrations even if total pollutant emissions are declining. The 1978 Idaho Air Quality Bureau special study and the Orchard Street monitoring station data both suggest that this situation occurs frequently on the bench area. The lack of such patterns in the downtown area probably reflects a flushing of polluted air by cold air drainage from the Boise Front into the Boise River Valley.

Idaho Transportation Department Monitoring Data

The Idaho Transportation Department operates a continuous CO monitor at its laboratory building off of State Street. Data have been collected since December 1975. No statistical data summaries are available. A preliminary review of the hourly data indicate five episodes of 8-hour CO levels above the federal standard (1 in 1976 and 4 in 1979). The highest 8-hour CO value appears to be a 10.6 ppm average on November 16, 1979 (7:00 a.m. to 3:00 p.m.). All of these episodes occurred during the early morning to early afternoon time period. The highest 1-hour CO level reported was 30 ppm on February 17, 1976 at 8:00 a.m. to 9:00 a.m. The pattern of hourly CO levels strongly suggests the influence of local vehicle parking activities plus some pollutant transport from other areas.

Earth Metrics Ozone Study

During late summer and fall of 1979, the Idaho Air Quality Bureau conducted a meteorological study to locate sites for future ozone monitoring stations. A cooperative effort was arranged between EPA and the state to provide ozone monitoring instruments to supplement the meteorological study. The results of this ozone study (Earth Metrics 1979) are available in EPA's Boise operations office.

Two monitoring sites southeast of Boise were used during this study, one near Mayfield and the other west of Mountain Home. No violations of the federal ozone standard were detected during the period that valid data were collected (August 15 through September 28, 1979). Subsequent ozone monitoring closer to Boise during 1980 (by the Idaho Air Quality Bureau) also failed to detect any violations of the federal ozone standard.

Air Quality Management Considerations

Institutional Framework

Federal and state activities related to air quality have been authorized by several pieces of legislation, the most important of which are the 1970 and 1977 amendments to the Clean Air Act. The 1970 Clean Air Act amendments set the basic structure for federal and state air pollution control programs. This basic structure has been retained under the 1977 Clean Air Act amendments.

The 1970 Clean Air Act amendments required each state to develop and adopt a plan (implementation plan) to achieve, maintain and enforce the national primary and secondary ambient air quality standards in all portions of the state. The 1970 amendments further required that these implementation plans provide the means for achieving and maintaining all national primary standards by July 1975 and all national secondary standards "within a reasonable time". EPA was granted the authority to approve or disapprove these plans, and to promulgate an acceptable plan if all or a portion of the submitted plan was disapproved. EPA was also given the authority to grant time extensions of up to 2 years for the attainment of a national primary ambient air quality standard in any particular air quality control region.

The 1977 Clean Air Act amendments recognized the fact that most of the major urban regions of the country failed to attain the national primary air quality standards within the deadlines set by the 1970 Clean Air Act amendments. The new amendments required the states and EPA to identify areas which meet all federal air quality standards; areas which exceed any of the federal standards; and areas where adequate ambient air quality monitoring data are lacking. Ada County has been designated a "nonattainment area" for carbon monoxide, as an "attainment area" for suspended particulate matter and sulfur dioxide, and as an "unclassifiable area" (areas where data are nonexistent or insufficient to determine attainment or nonattainment status) for ozone and nitrogen dioxide.

The 1977 amendments to the Clean Air Act establish numerous criteria for determining the adequacy of state implementation plans. Some of the more significant of these include the following requirements:

- The implementation plan must include special provisions for areas designated as nonattainment areas. Plans for nonattainment areas must provide a means of achieving the federal primary standards as expeditiously as possible, but not later than December 31, 1982.
- If an area is designated as a nonattainment area with respect to ozone or carbon monoxide, EPA can extend the deadline for achieving the federal air quality standard by up to 5 years (to December 31, 1987) provided a number of specified conditions are met.
- The implementation plan must include schedules and timetables for implementing emission limitations, transportation controls, air quality maintenance plans, preconstruction review of direct sources of pollution, and other measures necessary to ensure attainment and maintenance of the federal primary and secondary air quality standards.
- State implementation plans for nonattainment areas must provide for installation of "reasonably available control technology" on existing stationary sources.
- Plans for nonattainment areas must provide a means of achieving annual incremental reductions in the emissions of relevant pollutants so as to attain the federal air quality standards by the target date identified in the plan ("reasonable further progress" requirement).

- Plans for nonattainment areas must expressly identify and quantify pollutant emissions which will be allowed to result from the construction and operation of major new or modified stationary sources in the nonattainment area.

- The implementation plan must prohibit construction or modification of major stationary sources in nonattainment areas after June 30, 1979 if the state has failed to submit to EPA acceptable implementation plan revisions pertaining to that nonattainment area.

The 1977 Clean Air Act amendments indicate that implementation plan provisions for ozone and carbon monoxide nonattainment areas should be prepared by an appropriate organization of local government officials, as designated by the state. The Ada Planning Association (APA) has been designated as the lead agency for developing air quality management programs for Ada County.

The 1977 Clean Air Act amendments contain several provisions regarding federal permit activities or financial assistance programs. These provisions can be summarized as follows:

- After July 1, 1979 EPA is prohibited from awarding any grants authorized under the Clean Air Act, except for air quality improvement or maintenance purposes, if the agency applying for the grant is in an air quality control region where the following three conditions apply: one or more federal primary standards have not been attained; transportation control measures are necessary to achieve the standard being violated; and an appropriate state implementation plan has not been submitted (or reasonable efforts toward developing such a plan are not being made). This funding prohibition also applies if an approved plan is not being implemented.

- After July 1, 1979 the U. S. Department of Transportation is prohibited from awarding grants of approving projects under Title 23, United States Code, except for safety, mass transit, or transportation projects which improve air quality, if the agency applying for the grant funds or project approval is in an air quality control region where the three conditions cited above apply. This funding prohibition also applies if an approved plan is not being implemented.

- No federal agency can engage in, license, permit, approve, or support in any way any activity which does not conform to the approved or promulgated state implementation plan for the relevant area.

- EPA is authorized to withhold, condition, or restrict any grant for construction of sewage treatment facilities if it is determined that: a) such sewage treatment facilities will not comply with Clean Air Act provisions relating to new source performance standards or emission standards for hazardous air pollutants; b) the state does not have, or is not implementing, an approved state implementation plan which expressly quantifies and provides necessary management programs to deal with the air pollutant emissions which may reasonably be anticipated to result directly or indirectly from the new sewage treatment capacity to be created by such construction; c) the construction of such treatment works would create new sewage treatment capacity which may reasonably be anticipated to cause or contribute to, directly or indirectly, a larger increase in pollutant emissions than has been provided for under the applicable state implementation plan; or d) the construction of such treatment works would create new sewage treatment capacity which would cause or contribute to, directly or indirectly, an increase in pollutant emissions which will interfere with or be inconsistent with the applicable implementation plan of any other state.

Emissions Inventories and Forecasts

CO emissions have been estimated for several groups of emission sources in northern Ada County. The greatest attention has been devoted to sources in the Boise metropolitan area, since air quality monitoring data have documented serious CO problems throughout the Boise area. Emission estimates have been structured to reflect historical conditions for 1977 and 1980, and expected conditions for 1987 and 2000. Three broad categories of emission sources have been evaluated: vehicle traffic on major roadways, on- and off-street vehicle parking activity, and residential fuel combustion for space heating or appliance operation. Commercial and industrial fuel combustion emissions have not been estimated. Data for residential fuel combustion suggest that commercial and industrial sources are probably insignificant. Drive-up window facilities have not been directly evaluated for the emission inventories and forecasts discussed here. Data for parking facilities suggest that drive-up facilities may be significant localized emission sources. Hourly emission inventory and forecast results for the three major source categories are presented in Appendix F.

Procedures used to produce the emission inventories and forecasts are discussed in detail in Appendix A. All forecasts were based primarily on the same population and employment forecasts (APA 1978). Emissions from highway traffic were based on traffic volumes projected by the Boise area traffic model. Parking emissions were developed using a variety of parking surveys from the Boise area. Residential fuel combustion emissions were developed using data from a recent survey of energy usage patterns (Elrick and Lavidge 1980). All emission inventories and forecasts were prepared in a manner allowing results to be summarized by community planning area. The boundaries of community planning areas as used for the Boise area traffic model and the emission forecasting work are shown in Figures 9-9 and 9-10.

Results of the emission inventory and forecast work are summarized in Table 9-2. As is apparent from this table, use of wood stoves and fireplaces results in a significant contribution to total CO emissions in the Boise area. Because CO is a "primary" pollutant (i.e., emitted directly rather than being formed through chemical reactions), the total emissions burden in a regional area is not the best indicator of contributions to ambient pollutant levels. Source contributions to the ambient concentration of a primary pollutant are more accurately indicated by emission density, the amount of pollutants emitted per geographic area of the source. Relative emission density values (pounds of CO emissions per source category acre) are presented in Table 9-3. The relative potential for CO problems within different community planning areas is generally indicated by a comparison of emission source density index (ESDI) values. The ESDI value is obtained by adding the relative emission density values for each source category in a particular planning area or group of planning areas. The result is a somewhat artificial number, since the emission density values (pounds per acre) relate to different acres for each source category. Nevertheless, this emission density approach provides a useful evaluation of the relative importance of different emission sources.

The emission source density values in Table 9-3 indicate that vehicle activity (highway traffic and parking activities) is clearly the dominant factor in existing CO problems. Current and projected composite emission source density index (ESDI) values for the various community planning areas in the Boise area are shown in Figures 9-11, 9-12, and 9-13. The dominant influence of vehicle emissions is also apparent from the ambient air quality monitoring data discussed previously. Data used to develop the ESDI values, as well as

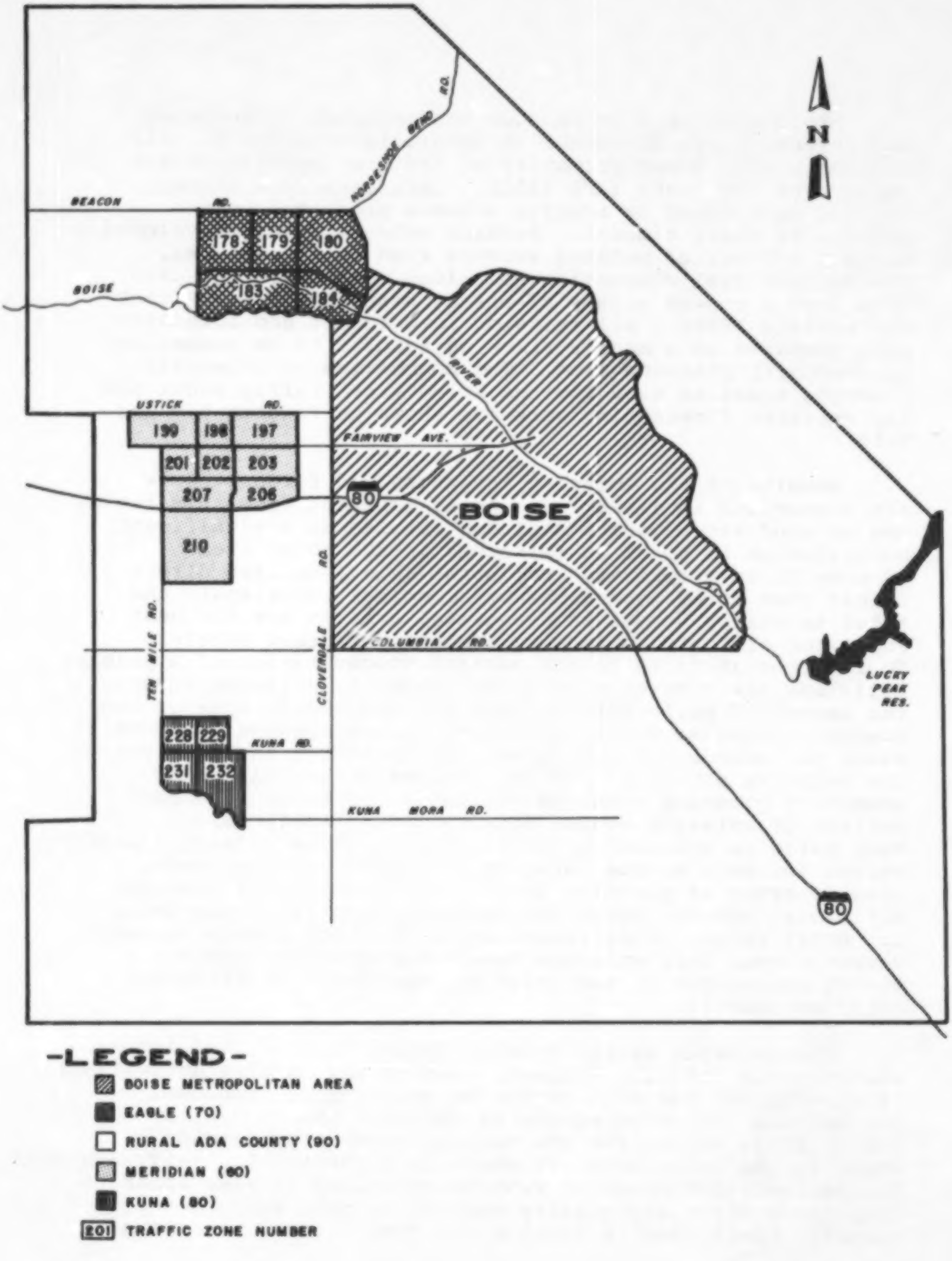

N
BEACON RD.
HORSESHOE BEND RD.
BOISE
RIVER
178
179
180
183
184
USTICK RD.
199
198
197
FAIRVIEW AVE.
201
202
203
207
206
80
BOISE
210
TEN MILE RD.
CLOVERDALE RD.
COLUMBIA RD.
LUCKY PEAK RES.
228
229
231
232
KUNA RD.
KUNA MORA RD.
80
-LEGEND-
BOISE METROPOLITAN AREA
EAGLE (70)
RURAL ADA COUNTY (90)
MERIDIAN (60)
KUNA (80)
201 TRAFFIC ZONE NUMBER

FIGURE 9-9. COMMUNITY PLANNING AREAS OUTSIDE THE BOISE METROPOLITAN AREA

FIGURE 9-10. COMMUNITY PLANNING AREAS IN THE METROPOLITAN BOISE AREA

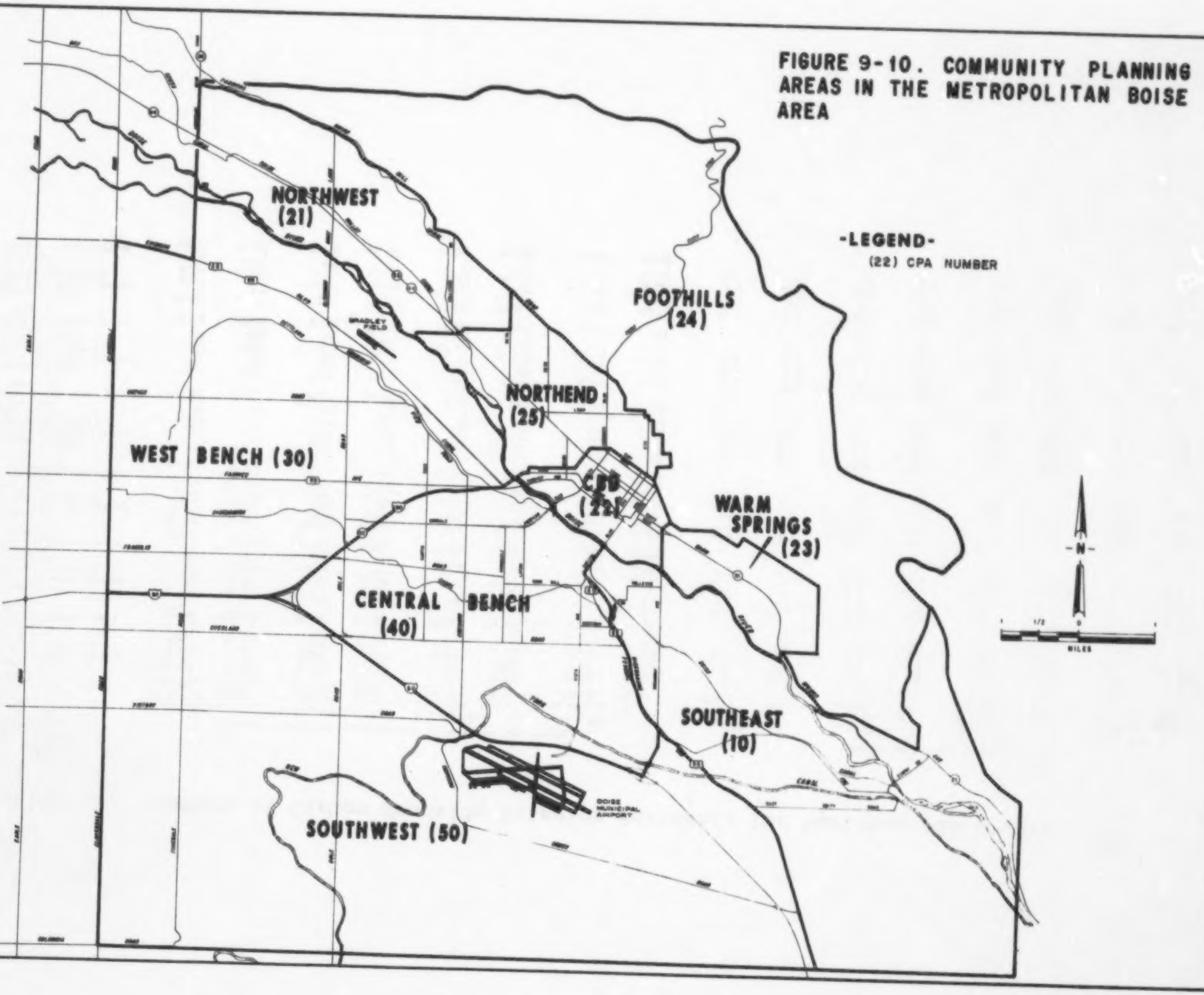

-LEGEND-
(22) CPA NUMBER
NORTHWEST (21)
FOOTHILLS (24)
NORTHEND (25)
CBD (22)
WARM SPRINGS (23)
WEST BENCH (30)
CENTRAL BENCH (40)
SOUTHEAST (10)
SOUTHWEST (50)
BRADLEY FIELD
BOISE MUNICIPAL AIRPORT
N
1/2
0
1
MILES

Table 9-2. Summary of Carbon Monoxide Emission Forecasts for Northern Ada County

Community Planning Area (CPA#)	Emission Source Category	Carbon Monoxide Emissions (pounds) for Indicated Time Periods								Percent Contribution to Emissions							
		1977		1980		1987		2000		1977		1980		1987		2000	
		10 am-6 pm Period	Daily Total	10 am-6 pm Period	Daily Total	10 am-6 pm Period	Daily Total	10 am-6 pm Period	Daily Total	10 am-6 pm Period	Daily Total	10 am-6 pm Period	Daily Total	10 am-6 pm Period	Daily Total	10 am-6 pm Period	Daily Total
Southeast Area (19)	Highway Traffic	20,926	35,375	25,635	43,418	23,900	39,438	25,025	38,965	74.9	63.4	75.0	63.5	67.6	51.8	59.9	40.2
	On- & Off-Street Parking	1,002	3,495	2,061	4,072	1,422	2,841	912	1,734	6.4	6.3	6.0	6.0	4.0	3.7	2.2	1.8
	Residential Parking	1,434	2,859	1,876	3,549	1,872	3,336	1,601	2,805	5.1	5.1	5.5	5.2	5.3	4.4	3.8	2.9
	Wood Stoves	3,464	12,753	4,244	15,626	7,507	27,640	13,085	48,179	12.4	22.8	12.4	22.9	21.2	36.3	31.3	49.8
	Fireplaces	313	1,355	383	1,660	678	2,937	1,182	5,119	1.1	2.4	1.1	2.4	1.9	3.9	2.8	5.3
	Other Residential Fuels	1	3	1	3	2	6	3	10	-	-	-	-	-	-	-	-
	Total	27,940	55,840	34,200	68,329	35,381	76,198	41,808	96,812								
Northwest Subarea (21)	Highway Traffic	11,812	19,674	13,779	22,977	11,881	19,385	9,520	14,974	80.6	70.4	78.6	68.2	68.3	52.9	54.6	35.4
	On- & Off-Street Parking	591	941	817	1,305	742	1,132	317	487	4.0	3.4	4.7	3.9	4.3	3.1	1.8	1.1
	Residential Parking	619	1,233	845	1,590	889	1,584	768	1,345	4.2	4.4	4.8	4.7	5.1	4.3	4.4	3.2
	Wood Stoves	1,494	5,500	1,912	7,038	3,564	13,122	6,272	23,093	10.2	19.7	10.9	20.9	20.5	35.8	36.0	54.5
	Fireplaces	135	584	173	748	322	1,394	566	2,454	0.9	2.1	1.0	2.2	1.9	3.8	3.2	5.8
	Other Residential Fuels	-	1	-	2	1	3	2	5	-	-	-	-	-	-	-	-
	Total	14,651	27,933	17,526	33,660	17,399	36,620	17,445	42,357								
CBD Subarea (22)	Highway Traffic	44,004	74,882	50,759	86,653	37,038	62,003	35,053	55,254	85.0	83.5	81.7	84.2	82.0	78.4	84.5	76.8
	On- & Off-Street Parking	5,598	7,673	5,845	8,186	5,371	7,781	2,837	4,037	10.8	8.6	9.4	8.0	11.9	9.8	6.8	5.6
	Residential Parking	606	1,207	731	1,382	511	910	362	635	1.2	1.3	1.2	1.3	1.1	1.2	0.9	0.9
	Wood Stoves	1,463	5,385	1,653	6,086	2,049	7,543	2,961	10,901	2.8	6.0	7.5	5.9	4.5	9.5	7.1	15.1
	Fireplaces	132	572	149	647	185	801	267	1,158	0.3	0.6	0.2	0.6	0.4	1.0	0.6	1.6
	Other Residential Fuels	-	1	-	1	1	2	1	2	-	-	-	-	-	-	-	-
	Total	51,843	89,720	62,137	102,955	45,155	79,040	41,481	71,988								
Warm Springs Subarea (23)	Highway Traffic	4,998	8,391	6,396	10,754	4,817	7,906	5,075	7,842	74.8	61.5	77.4	65.1	71.0	56.1	70.7	51.9
	On- & Off-Street Parking	157	270	137	239	220	291	77	93	2.3	2.2	1.7	1.4	3.2	2.1	1.1	0.6
	Residential Parking	421	839	498	943	325	580	205	359	6.3	6.2	6.0	5.7	4.8	4.1	2.9	2.4
	Wood Stoves	1,017	3,743	1,128	4,152	1,305	4,804	1,675	6,168	15.2	27.4	13.7	25.1	19.2	34.1	23.3	40.8
	Fireplaces	92	398	102	441	118	510	151	655	1.4	2.9	1.2	2.7	1.7	3.6	2.1	4.3
	Other Residential Fuels	-	1	-	1	-	1	-	1	-	-	-	-	-	-	-	-
	Total	6,685	13,642	8,261	16,530	6,785	14,092	7,183	15,119								
Foothills Subarea (24)	Highway Traffic	4,061	6,821	5,007	8,420	5,807	9,548	6,069	9,658	58.3	42.6	59.0	43.6	58.1	40.5	52.4	32.7
	On- & Off-Street Parking	232	474	222	485	117	260	71	84	3.3	3.0	2.6	2.5	1.2	1.1	0.6	0.3
	Residential Parking	736	1,468	940	1,777	758	1,352	286	547	10.6	9.2	11.1	9.2	7.6	5.7	2.5	1.8
	Wood Stoves	1,778	6,547	2,126	7,827	3,041	11,198	4,734	17,429	25.5	40.9	25.0	40.4	30.4	47.5	40.8	58.9
	Fireplaces	161	696	192	832	275	1,190	428	1,852	2.3	4.3	2.3	4.3	2.8	5.1	3.7	6.3
	Other Residential Fuels	-	1	1	2	1	2	1	4	-	-	-	-	-	-	-	-
	Total	6,968	16,007	8,488	19,330	9,999	23,559	11,589	29,576								
Northend Subarea (25)	Highway Traffic	24,207	40,768	27,121	45,753	16,039	26,561	13,885	21,740	75.1	61.0	76.1	62.8	68.0	51.2	66.7	47.1
	On- & Off-Street Parking	247	646	274	702	173	408	70	171	0.8	1.0	0.8	1.0	0.7	0.8	0.3	0.4
	Residential Parking	2,147	4,279	2,372	4,488	1,372	2,445	693	1,214	6.7	6.4	6.7	6.2	5.8	4.7	3.3	2.6
	Wood Stoves	5,184	19,088	5,367	19,762	5,502	20,258	5,662	20,847	16.0	28.6	15.1	27.1	23.3	39.1	27.2	45.1
	Fireplaces	468	2,028	485	2,100	497	2,152	511	2,219	1.5	3.0	1.4	2.9	2.1	4.2	2.5	4.8
	Other Residential Fuels	1	4	1	4	1	4	1	4	-	-	-	-	-	-	-	-
	Total	32,254	66,813	35,620	72,889	23,584	51,828	20,822	46,192								

Table 9-2 (cont'd.)

Community Planning Area (CPA#)	Emission Source Category	Carbon Monoxide Emissions (pounds) for Indicated Time Periods								Percent Contribution to Emissions							
		1977		1980		1987		2000		1977		1980		1987		2000	
		10 am-6 pm Period	Daily Total	10 am-6 pm Period	Daily Total	10 am-6 pm Period	Daily Total	10 am-6 pm Period	Daily Total	10 am-6 pm Period	Daily Total	10 am-6 pm Period	Daily Total	10 am-6 pm Period	Daily Total	10 am-6 pm Period	Daily Total
West Bench Area (30)	Highway Traffic	71,383	120,752	84,349	142,637	58,206	96,139	51,443	81,944	81.4	73.7	82.5	75.2	78.4	67.2	76.0	60.9
	On- & Off-Street Parking	5,545	8,226	5,843	8,743	3,757	5,512	2,246	3,192	6.3	5.0	5.7	4.6	5.1	3.9	3.3	2.4
	Residential Parking	2,956	5,890	3,458	6,542	2,290	4,080	1,409	2,469	3.4	3.6	3.4	3.4	3.1	2.9	2.1	1.8
	Wood Stoves	7,137	26,279	7,823	28,805	9,182	33,808	11,517	42,407	8.1	16.0	7.7	15.2	12.4	23.6	17.0	31.5
	Fireplaces	645	2,792	707	3,061	829	3,592	1,040	4,506	0.7	1.7	0.7	1.6	1.1	2.5	1.5	3.3
	Other Residential Fuels	2	6	2	6	2	7	1	9	-	-	-	-	-	-	-	-
	Total	87,658	163,945	102,182	189,794	74,266	143,138	67,658	134,526								
Central Bench Area (40)	Highway Traffic	65,153	112,101	71,419	122,987	54,115	90,442	37,428	60,702	78.0	68.1	78.1	68.8	76.6	64.0	70.5	53.4
	On- & Off-Street Parking	4,397	6,871	5,148	8,008	2,675	4,128	1,243	1,894	5.3	4.2	5.6	4.5	3.8	2.9	2.3	1.7
	Residential Parking	3,859	7,691	4,303	8,141	2,581	4,600	1,455	2,548	4.6	4.7	4.7	4.6	3.7	3.3	2.7	2.2
	Wood Stoves	9,318	34,310	9,735	35,846	10,351	38,113	11,886	43,765	11.1	20.8	10.6	20.0	14.6	27.0	22.4	38.5
	Fireplaces	842	3,645	879	3,809	935	4,049	1,074	4,650	1.0	2.2	1.0	2.1	1.3	2.9	2.0	4.1
	Other Residential Fuels	2	7	2	8	3	8	3	9	-	-	-	-	-	-	-	-
	Total	83,571	164,626	91,486	178,798	70,660	141,340	53,089	113,569								
Southwest Area (50)	Highway Traffic	38,691	66,143	44,348	75,707	35,530	58,848	36,138	56,346	88.3	82.8	88.2	82.5	85.3	76.6	82.0	68.7
	On- & Off-Street Parking	1,797	2,843	1,816	2,937	1,507	2,377	1,171	1,823	4.1	3.6	3.6	3.2	3.6	3.1	2.7	2.2
	Residential Parking	921	1,835	1,182	2,235	859	1,532	681	1,193	2.1	2.3	2.4	2.4	2.1	2.0	1.5	1.5
	Wood Stoves	2,223	8,187	2,673	9,843	3,447	12,691	5,566	20,495	5.1	10.2	5.3	10.7	8.3	16.5	12.6	25.0
	Fireplaces	201	870	241	1,046	311	1,348	503	2,178	0.5	1.1	0.5	1.1	0.7	1.8	1.1	2.7
	Other Residential Fuels	1	2	1	2	1	2	1	4	-	-	-	-	-	-	-	-
	Total	43,834	79,879	50,259	91,769	41,655	76,798	44,060	82,039								
Boise Metropolitan Area Subtotal	Highway Traffic	285,236	484,907	328,813	559,291	247,332	410,271	219,636	347,424	80.3	71.5	80.8	72.3	76.1	63.8	72.0	55.0
	On- & Off-Street Parking	20,368	31,441	22,163	34,677	15,983	24,738	8,945	13,515	5.7	4.6	5.4	4.5	4.9	3.8	2.9	2.1
	Residential Parking	13,698	27,299	16,204	30,655	11,458	20,419	7,460	13,115	3.9	4.0	4.0	4.0	3.5	3.2	2.4	2.1
	Wood Stoves	33,077	121,789	36,660	134,984	45,948	169,180	63,358	233,285	9.3	18.0	9.0	17.4	14.1	26.3	20.8	36.9
	Fireplaces	2,988	12,940	3,311	14,342	4,150	17,975	5,733	24,787	0.8	1.9	0.8	1.9	1.3	2.8	1.9	3.9
	Other Residential Fuels	8	26	9	27	11	34	14	50	-	-	-	-	-	-	-	-
	Total	355,375	678,403	407,160	774,000	324,882	642,617	305,138	632,175								
Meridian Area (60)	Highway Traffic	17,156	28,667	19,306	32,296	10,276	16,830	10,516	16,440	87.2	77.1	86.6	76.6	72.2	55.3	60.9	40.6
	On- & Off-Street Parking	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	Residential Parking	633	1,457	794	1,693	672	1,334	626	1,204	3.2	3.9	3.6	4.0	4.7	4.4	3.6	3.0
	Wood Stoves	1,734	6,386	2,006	7,387	3,008	11,076	5,606	20,643	8.8	17.2	9.0	17.5	21.1	36.4	32.5	51.0
	Fireplaces	157	679	181	785	272	1,177	506	2,193	0.8	1.8	0.8	1.9	1.9	3.9	2.9	5.4
	Other Residential Fuels	-	1	1	2	1	2	1	4	-	-	-	-	-	-	-	-
	Total	19,680	37,190	22,288	42,163	14,229	30,419	17,255	40,484								
Eagle Area (70)	Highway Traffic	5,623	9,387	6,391	10,677	6,085	9,941	5,293	8,278	83.2	70.9	82.0	69.6	76.4	60.7	62.9	42.7
	On- & Off-Street Parking	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	Residential Parking	273	628	366	785	320	633	293	562	4.0	4.7	4.7	5.1	4.0	3.9	3.5	2.9
	Wood Stoves	790	2,908	951	3,503	1,427	5,256	2,591	9,540	11.7	22.0	12.2	22.8	17.9	32.1	30.8	49.2
	Fireplaces	71	309	86	372	129	558	234	1,014	1.1	2.3	1.1	2.4	1.6	3.4	2.8	5.2
	Other Residential Fuels	-	1	-	1	-	1	1	1	-	-	-	-	-	-	-	-
	Total	6,757	13,233	7,794	15,338	7,961	16,387	8,412	19,395								

Table 9-2 (cont'd.)

Community Planning Area (CPA#)	Emission Source Category	Carbon Monoxide Emissions (pounds) for Indicated Time Periods								Percent Contribution to Emissions							
		1977		1980		1987		2000		1977		1980		1987		2000	
		10 am-6 pm Period	Daily Total	10 am-6 pm Period	Daily Total	10 am-6 pm Period	Daily Total	10 am-6 pm Period	Daily Total	10 am-6 pm Period	Daily Total	10 am-6 pm Period	Daily Total	10 am-6 pm Period	Daily Total	10 am-6 pm Period	Daily Total
Kuna Area (80)	Highway Traffic	860	1,431	1,036	1,731	864	1,409	794	1,257	62.5	44.9	61.6	44.5	46.7	29.3	30.0	15.9
	On- & Off-Street Parking	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	Residential Parking	117	262	154	328	159	309	157	300	8.5	8.2	9.2	8.4	8.6	6.4	5.9	3.8
	Wood Stoves	366	1,348	450	1,659	759	2,796	1,557	5,732	26.6	42.3	26.8	42.6	41.0	58.1	58.8	72.6
	Fireplaces	33	143	41	176	69	297	141	609	2.4	4.5	2.4	4.5	3.7	6.2	5.3	7.7
	Other Residential Fuels	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-
	Total	1,376	3,184	1,681	3,894	1,851	4,812	2,649	7,899								
Rural Ada County Area (90)	Highway Traffic	56,425	94,016	63,639	106,128	44,407	72,464	35,490	56,092	95.3	90.8	95.2	90.8	92.3	85.1	88.4	77.1
	On- & Off-Street Parking	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	Residential Parking	657	1,519	805	1,731	602	1,186	399	772	1.1	1.5	1.2	1.5	1.3	1.4	1.0	1.1
	Wood Stoves	1,977	7,278	2,214	8,151	2,829	10,418	3,910	14,398	3.3	7.0	3.3	7.0	5.9	12.2	9.7	19.8
	Fireplaces	179	773	200	866	256	1,107	353	1,530	0.3	0.7	0.3	0.7	0.5	1.3	0.9	2.1
	Other Residential Fuels	-	2	1	2	1	2	1	3	-	-	-	-	-	-	-	-
	Total	59,238	103,588	66,859	116,878	48,095	85,177	40,153	72,795								
Total Northern Ada County	Highway Traffic	365,304	618,405	419,180	710,142	308,960	510,915	271,733	429,496	82.6	74.0	82.9	74.6	77.8	65.6	72.7	55.6
	On- & Off-Street Parking	20,368	31,441	22,163	34,677	15,983	24,738	8,945	13,515	4.6	3.8	4.4	3.6	4.0	3.2	2.4	1.7
	Residential Parking	15,365	31,166	18,334	35,192	13,211	23,878	8,934	15,952	3.5	3.7	3.6	3.7	3.3	3.1	2.4	2.1
	Wood Stoves	37,944	139,709	42,282	155,684	53,971	198,721	77,022	283,597	8.6	16.7	8.4	16.3	13.6	25.5	20.6	36.7
	Fireplaces	3,427	14,844	3,819	16,541	4,875	21,114	6,957	30,132	0.8	1.8	0.8	1.7	1.2	2.7	1.9	3.9
	Other Residential Fuels	9	30	10	33	13	42	19	60	-	-	-	-	-	-	-	-
	Total	442,417	835,595	505,788	952,270	397,013	779,408	373,610	772,752								

Notes and Sources:

Emission forecasting procedures are discussed in Appendix A.

Residential parking component separated from total parking emissions by applying a programmable calculator version of the parking emissions program to estimated daily home-based vehicle trips listed in Table 9-4. Resulting estimates for CPAs 60, 70, 80, and 90 disregarded, and computer program output for total parking emissions used instead. Year 2000 results for CPA 24 also disregarded due to inconsistency with computer program output. For CPA 24, emissions from traffic zone 87 were allocated to on- and off-street parking, with the remainder allocated to residential parking. Inconsistencies are due primarily to procedures used to estimate home-based vehicle trips for each CPA.

Results may not add to subtotals or totals due to rounding and/or independent calculation of subtotals and totals.

NC = Not calculated; no on- and off-street parking surveys available for this area.

"—" = Less than 0.5 pound of emissions, or less than 0.05 percent of total emissions.

Table 9-3. Carbon Monoxide Emission Densities in Northern Ada County

Community Planning Area (CPA#)	Emission Source Category	Relative Emission Densities[1] for Source Areas (pounds per acre)								Percent Contribution to ESDI[2]							
		1977		1980		1987		2000		1977		1980		1987		2000	
		10 am-6 pm Period	Daily Total	10 am-6 pm Period	Daily Total	10 am-6 pm Period	Daily Total	10 am-6 pm Period	Daily Total	10 am-6 pm Period	Daily Total	10 am-6 pm Period	Daily Total	10 am-6 pm Period	Daily Total	10 am-6 pm Period	Daily Total
Southeast Area (10)	Highway Traffic	123.31	208.46	137.33	232.60	85.36	140.85	89.38	139.16	78.6	74.6	80.1	76.1	81.0	75.6	89.3	84.1
	On- & Off-Street Parking	29.16	56.56	29.63	58.55	16.03	32.03	7.16	13.62	18.6	20.2	17.3	19.2	15.2	17.2	7.2	8.2
	Residential Parking	1.23	2.45	1.31	2.48	0.74	1.32	0.36	0.64	0.8	0.9	0.8	0.8	0.7	0.7	0.4	0.4
	Residential Fuel Use	3.23	12.07	3.23	12.07	3.23	12.07	3.23	12.07	2.1	4.3	1.9	3.9	3.1	6.5	3.2	7.3
	ESDI[2]	156.93	279.54	171.50	305.70	105.36	186.27	100.13	165.49								
Northwest Subarea (21)	Highway Traffic	126.56	210.79	147.63	246.18	116.69	190.39	93.50	147.07	75.9	74.7	78.1	77.0	82.3	80.6	88.2	84.7
	On- & Off-Street Parking	35.52	56.56	36.66	58.55	20.99	32.03	8.87	13.62	21.3	20.0	19.4	18.3	14.8	13.6	8.4	7.8
	Residential Parking	1.26	2.51	1.34	2.54	0.76	1.35	0.37	0.65	0.8	0.9	0.7	0.8	0.5	0.6	0.3	0.4
	Residential Fuel Use	3.31	12.37	3.31	12.38	3.31	12.38	3.31	12.37	2.0	4.4	1.8	3.9	2.3	5.2	3.1	7.1
	ESDI[2]	166.65	282.23	188.94	319.65	141.75	236.15	106.05	173.71								
CBD Subarea (22)	Highway Traffic	235.74	401.15	271.92	464.21	181.88	304.48	172.14	271.34	83.7	84.9	85.4	86.3	87.4	86.9	92.9	91.1
	On- & Off-Street Parking	41.26	56.56	41.81	58.55	22.11	32.03	9.57	13.62	14.7	12.0	13.1	10.9	10.6	9.1	5.2	4.6
	Residential Parking	1.26	2.51	1.34	2.54	0.76	1.35	0.37	0.65	0.4	0.5	0.4	0.5	0.4	0.4	0.2	0.2
	Residential Fuel Use	3.32	12.39	3.31	12.38	3.32	12.38	3.31	12.37	1.2	2.6	1.0	2.3	1.6	3.5	1.8	4.2
	ESDI[2]	281.58	472.61	318.38	537.68	208.07	350.24	185.39	297.98								
Warm Springs Subarea (23)	Highway Traffic	147.26	247.23	188.45	316.86	141.93	232.94	149.53	231.06	79.7	77.6	83.1	81.2	83.4	83.6	90.9	89.7
	On- & Off-Street Parking	32.89	56.56	33.56	58.55	24.22	32.03	11.28	13.62	17.8	17.7	14.8	15.0	14.2	11.5	6.9	5.3
	Residential Parking	1.26	2.50	1.34	2.54	0.76	1.35	0.37	0.65	0.7	0.8	0.6	0.7	0.4	0.5	0.2	0.3
	Residential Fuel Use	3.31	12.36	3.32	12.38	3.31	12.36	3.31	12.38	1.8	3.9	1.5	3.2	1.9	4.4	2.0	4.8
	ESDI[2]	184.72	318.65	226.67	390.33	170.22	278.68	164.49	257.71								
Foothills Subarea (24)	Highway Traffic	36.82	61.84	45.39	76.41	52.65	86.56	55.02	87.56	56.1	50.7	61.9	55.1	77.9	71.0	81.7	84.0
	On- & Off-Street Parking	27.68	56.56	26.80	58.55	13.98	32.03	11.51	13.62	42.2	46.3	36.5	42.2	20.7	26.3	17.1	13.1
	Residential Parking	0.31	0.61	0.35	0.66	0.18	0.33	0.04	0.09	0.5	0.5	0.5	0.5	0.3	0.3	0.1	0.1
	Residential Fuel Use	0.81	3.02	0.81	3.02	0.81	3.02	0.81	3.02	1.2	2.5	1.1	2.2	1.2	2.5	1.2	2.9
	ESDI[2]	65.62	122.03	73.35	138.64	67.62	121.94	67.38	104.29								
Northend Subarea (25)	Highway Traffic	190.20	320.32	213.09	359.49	145.41	240.80	125.88	197.09	87.9	81.8	88.6	83.0	89.2	84.0	93.1	88.1
	On- & Off-Street Parking	21.63	56.56	22.85	58.55	13.58	32.03	5.58	13.62	10.0	14.4	9.5	13.5	8.3	11.2	4.1	6.1
	Residential Parking	1.26	2.51	1.34	2.54	0.76	1.35	0.37	0.65	0.6	0.6	0.6	0.6	0.5	0.5	0.3	0.3
	Residential Fuel Use	3.31	12.37	3.31	12.37	3.31	12.38	3.31	12.37	1.5	3.2	1.4	2.9	2.0	4.3	2.4	5.5
	ESDI[2]	216.40	391.76	240.59	432.95	163.06	286.56	135.14	223.73								
West Bench Area (30)	Highway Traffic	147.60	249.68	165.69	280.18	112.46	185.75	99.39	158.32	77.8	78.3	79.4	79.7	81.6	80.9	88.6	86.5
	On- & Off-Street Parking	38.13	56.56	39.13	58.55	21.83	32.03	9.58	13.62	20.1	17.7	18.7	16.7	15.8	14.0	8.5	7.4
	Residential Parking	1.07	2.14	1.15	2.17	0.65	1.15	0.32	0.56	0.6	0.7	0.6	0.6	0.5	0.5	0.3	0.3
	Residential Fuel Use	2.83	10.57	2.83	10.56	2.83	10.56	2.83	10.57	1.5	3.3	1.4	3.0	2.1	4.6	2.5	5.8
	ESDI[2]	189.63	318.95	208.80	351.46	137.77	229.49	112.12	183.07								

Table 9-3 (cont'd.)

Relative Emission Densities[1] for Source Areas (pounds per acre)

Community Planning Area (CPA#)	Emission Source Category	1977		1980		1987		2000	
		10 am-6 pm Period	Daily Total	10 am-6 pm Period	Daily Total	10 am-6 pm Period	Daily Total	10 am-6 pm Period	Daily Total
Central Bench Area (40)	Highway Traffic	170.64	293.60	187.05	322.11	138.65	231.72	95.89	155.53
	On- & Off-Street Parking	36.19	56.56	37.64	58.55	20.76	32.03	8.94	13.62
	Residential Parking	0.98	1.96	1.05	1.98	0.59	1.05	0.29	0.51
	Residential Fuel Use	2.59	9.66	2.59	9.66	2.59	9.66	2.59	9.66
	ESDI[2]	210.40	361.78	228.33	392.30	162.59	274.46	107.71	179.32
Southwest Area (50)	Highway Traffic	66.09	112.98	75.75	129.31	60.69	100.52	61.73	96.24
	On- & Off-Street Parking	35.75	56.56	36.16	58.55	20.31	32.03	8.75	13.62
	Residential Parking	0.40	0.80	0.43	0.81	0.24	0.43	0.12	0.21
	Residential Fuel Use	1.05	3.93	1.05	3.92	1.05	3.92	1.05	3.92
	ESDI[2]	103.29	174.27	113.39	192.59	82.29	136.90	71.65	113.99
Average, Boise Metropolitan Area	Highway Traffic	131.31	223.24	148.48	252.55	106.00	175.83	94.13	148.90
	On- & Off-Street Parking	36.64	56.56	37.42	58.55	20.70	32.03	9.02	13.62
	Residential Parking	0.88	1.75	0.93	1.75	0.52	0.92	0.24	0.42
	Residential Fuel Use	2.32	8.65	2.28	8.53	2.26	8.43	2.19	8.20
	ESDI[2]	136.08	290.20	189.11	321.38	129.48	217.21	105.58	171.14
Meridian Area (60)	Highway Traffic	72.21	120.66	81.26	135.94	48.44	79.34	49.58	77.50
	On- & Off-Street Parking	NC	NC	NC	NC	NC	NC	NC	NC
	Residential Parking	0.81	1.87	0.88	1.87	0.50	0.99	0.25	0.48
	Residential Fuel Use	2.42	9.06	2.42	9.05	2.42	9.06	2.42	9.06
	ESDI[2]	75.44	131.59	84.56	146.86	51.36	89.39	52.25	87.04
Eagle Area (70)	Highway Traffic	73.63	122.93	83.69	139.82	59.76	97.63	51.98	81.30
	On- & Off-Street Parking	NC	NC	NC	NC	NC	NC	NC	NC
	Residential Parking	0.77	1.77	0.86	1.83	0.50	0.99	0.25	0.48
	Residential Fuel Use	2.43	9.06	2.42	9.06	2.42	9.05	2.42	9.05
	ESDI[2]	76.83	133.76	86.97	150.71	62.68	107.67	54.65	90.83
Kuna Area (80)	Highway Traffic	11.26	18.74	13.57	22.67	11.31	18.45	10.40	16.46
	On- & Off-Street Parking	NC	NC	NC	NC	NC	NC	NC	NC
	Residential Parking	0.71	1.59	0.76	1.62	0.46	0.90	0.22	0.43
	Residential Fuel Use	2.42	9.04	2.42	9.04	2.42	9.05	2.43	9.06
	ESDI[2]	14.39	29.37	16.75	33.33	14.19	28.40	13.05	25.95
Rural Ada County Area (99)	Highway Traffic	28.42	47.35	32.05	53.45	23.36	38.13	18.67	29.51
	On- & Off-Street Parking	NC	NC	NC	NC	NC	NC	NC	NC
	Residential Parking	0.25	0.57	0.27	0.58	0.16	0.31	0.08	0.15
	Residential Fuel Use	0.81	3.02	0.81	3.02	0.81	3.02	0.81	3.02
	ESDI[2]	29.47	50.94	33.13	57.05	24.33	41.46	19.56	32.68
Average, Northern Ada County	Highway Traffic	80.32	134.72	91.32	154.70	66.81	110.49	58.76	92.88
	On- & Off-Street Parking	36.64	56.56	37.42	58.55	20.70	32.03	9.02	13.62
	Residential Parking	0.79	1.59	0.83	1.60	0.47	0.84	0.22	0.39
	Residential Fuel Use	2.12	7.91	2.09	7.82	2.07	7.75	2.04	7.62
	ESDI[2]	119.87	200.78	159.29	222.67	90.05	107.43	70.04	114.51

Percent Contribution to ESDI[2]

Community Planning Area (CPA#)	Emission Source Category	1977		1980		1987		2000	
		10 am-6 pm Period	Daily Total	10 am-6 pm Period	Daily Total	10 am-6 pm Period	Daily Total	10 am-6 pm Period	Daily Total
Central Bench Area (40)	Highway Traffic	81.1	81.2	81.9	82.1	85.3	84.4	89.0	86.7
	On- & Off-Street Parking	17.2	15.6	16.5	14.9	12.8	11.7	8.3	7.6
	Residential Parking	0.5	0.5	0.5	0.5	0.4	0.4	0.3	0.3
	Residential Fuel Use	1.2	2.7	1.1	2.5	1.6	3.5	2.4	5.4
Southwest Area (50)	Highway Traffic	64.0	64.8	66.8	67.1	73.8	73.4	86.2	84.4
	On- & Off-Street Parking	34.6	32.5	31.9	30.4	24.7	23.4	12.2	11.9
	Residential Parking	0.4	0.5	0.4	0.4	0.3	0.3	0.2	0.2
	Residential Fuel Use	1.0	2.3	0.9	2.0	1.3	2.9	1.5	3.4
Average, Boise Metropolitan Area	Highway Traffic	70.7	76.9	78.5	78.6	81.9	80.9	89.2	87.0
	On- & Off-Street Parking	26.9	19.5	19.8	18.2	16.0	14.7	8.5	8.0
	Residential Parking	0.6	0.6	0.5	0.5	0.4	0.4	0.2	0.2
	Residential Fuel Use	1.7	3.0	1.2	2.7	1.7	3.9	2.1	4.8
Meridian Area (60)	Highway Traffic	95.7	91.7	96.1	92.6	94.3	88.8	94.9	89.0
	On- & Off-Street Parking	NC	NC	NC	NC	NC	NC	NC	NC
	Residential Parking	1.1	1.4	1.0	1.3	1.0	1.1	0.5	0.6
	Residential Fuel Use	3.2	6.9	2.9	6.2	4.7	10.1	4.6	10.4
Eagle Area (70)	Highway Traffic	95.8	91.9	96.2	92.8	95.3	90.7	95.1	89.5
	On- & Off-Street Parking	NC	NC	NC	NC	NC	NC	NC	NC
	Residential Parking	1.0	1.3	1.0	1.2	0.8	0.9	0.5	0.5
	Residential Fuel Use	3.2	6.8	2.8	6.0	3.9	8.4	4.4	10.0
Kuna Area (80)	Highway Traffic	78.2	63.8	81.0	68.0	79.7	65.0	79.7	63.4
	On- & Off-Street Parking	NC	NC	NC	NC	NC	NC	NC	NC
	Residential Parking	4.9	5.4	4.5	4.9	3.2	3.2	1.7	1.7
	Residential Fuel Use	16.8	30.8	14.4	27.1	17.1	31.9	18.6	34.9
Rural Ada County Area (99)	Highway Traffic	96.4	93.0	96.7	93.7	96.0	92.0	95.4	90.3
	On- & Off-Street Parking	NC	NC	NC	NC	NC	NC	NC	NC
	Residential Parking	0.8	1.1	0.8	1.0	0.7	0.7	0.4	0.5
	Residential Fuel Use	2.7	5.9	2.4	5.3	3.3	7.3	4.1	9.2
Average, Northern Ada County	Highway Traffic	67.0	67.1	57.3	69.5	74.2	62.2	83.9	81.1
	On- & Off-Street Parking	30.6	28.2	36.8	26.3	23.0	29.8	12.9	11.9
	Residential Parking	0.7	0.8	1.0	0.7	0.5	0.8	0.3	0.3
	Residential Fuel Use	1.8	3.9	4.9	3.5	2.3	7.2	2.9	6.7

NOTES AND SOURCES:

NC - Not calculated due to lack of parking survey data.

[1] Relative Emission Density = Source category emissions from Table 9-2 divided by estimated acreage of emission source category. Highway acreages based on roadway miles (Table 9-4) and assumed average roadway width of 70 feet. On- and off-street parking acreage estimated for Boise Metropolitan Area as a whole using hand tabulation of parking facility data files and assumed average of 420 square feet per parking space. Average source density for metropolitan area used as daily total value for all component CPAs. 10 a.m.-6 p.m. values for each CPA calculated from ratio of 8-hour to daily emissions in Table 9-2. Residential acreages from Table 9-4 used for residential parking and residential fuel use categories.

[2] ESDI = Emission Source Density Index. This index calculated as the sum of source category relative emission densities.

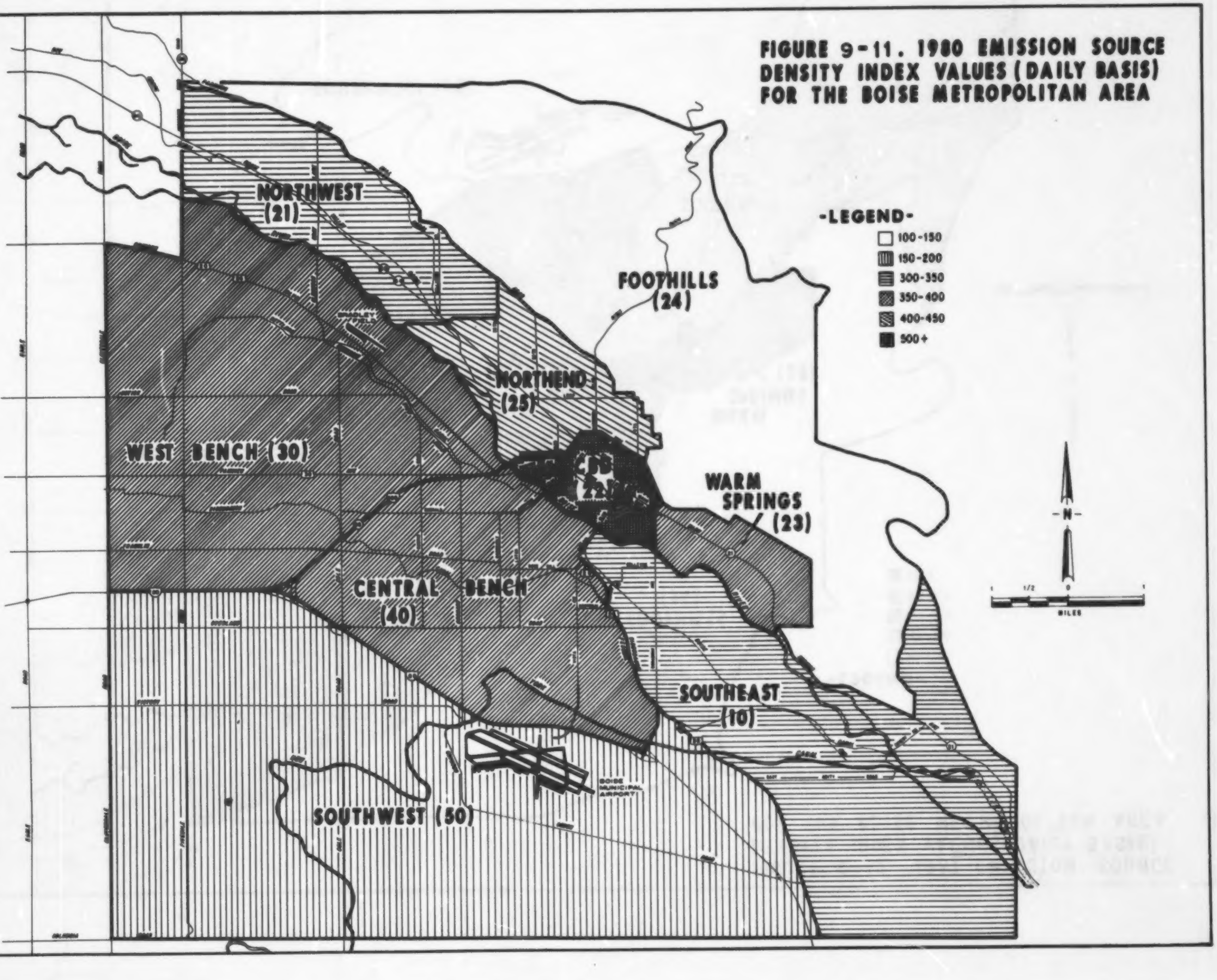


FIGURE 9-11. 1980 EMISSION SOURCE DENSITY INDEX VALUES (DAILY BASIS) FOR THE BOISE METROPOLITAN AREA

-LEGEND-
□ 100-150
▥ 150-200
▤ 300-350
▩ 350-400
▨ 400-450
■ 500+
NORTHWEST (21)
FOOTHILLS (24)
NORTHEND (25)
WEST BENCH (30)
CBD (22)
WARM SPRINGS (23)
CENTRAL BENCH (40)
SOUTHEAST (10)
SOUTHWEST (50)
BOISE MUNICIPAL AIRPORT
-N-
1 1/2 0 1
MILES

FIGURE 9-12. 1987 EMISSION SOURCE DENSITY INDEX VALUES (DAILY BASIS) FOR THE BOISE METROPOLITAN AREA

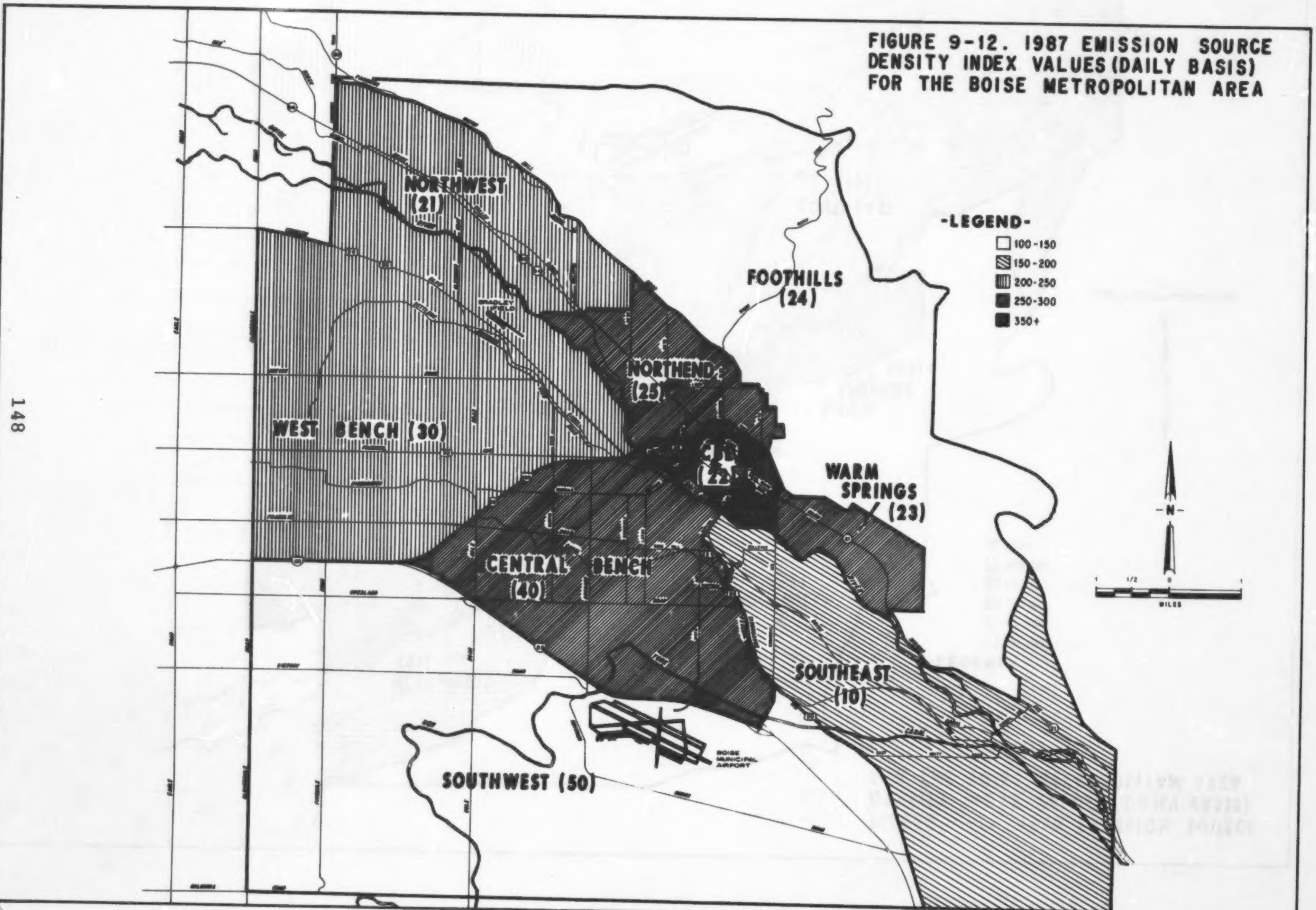
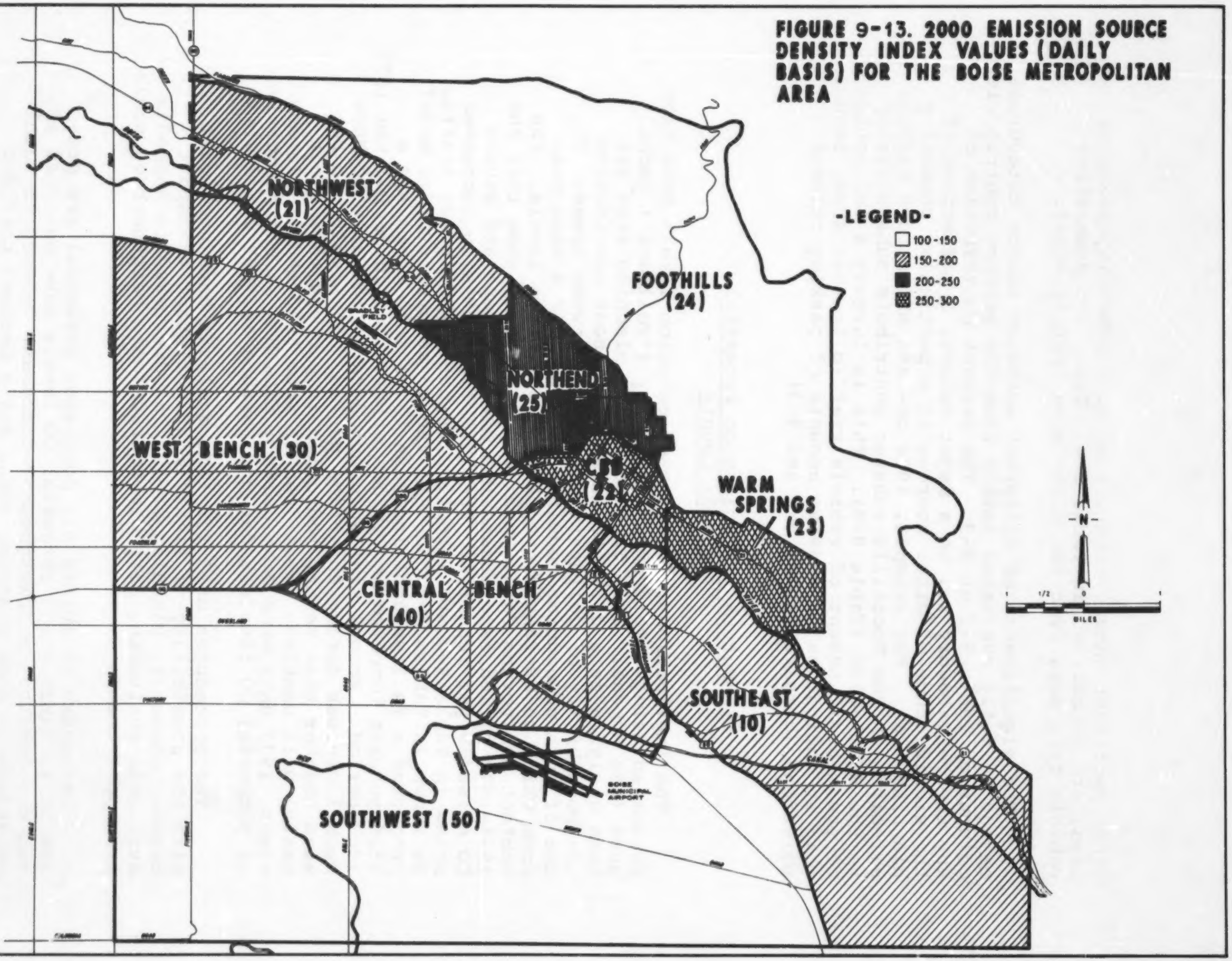

-LEGEND-
□ 100-150
▨ 150-200
▥ 200-250
▩ 250-300
■ 350+
NORTHWEST (21)
WEST BENCH (30)
FOOTHILLS (24)
NORTHEND (25)
(22)
WARM SPRINGS (23)
CENTRAL BENCH (40)
SOUTHEAST (10)
SOUTHWEST (50)
BOISE MUNICIPAL AIRPORT
BRADLEY FIELD
-N-
1 1/2 0 1
MILES

FIGURE 9-13. 2000 EMISSION SOURCE DENSITY INDEX VALUES (DAILY BASIS) FOR THE BOISE METROPOLITAN AREA


-LEGEND-
□ 100-150
▨ 150-200
■ 200-250
▩ 250-300
NORTHWEST (21)
WEST BENCH (30)
NORTHEND (25)
FOOTHILLS (24)
CBD (22)
WARM SPRINGS (23)
CENTRAL BENCH (40)
SOUTHEAST (10)
SOUTHWEST (50)
BOISE MUNICIPAL AIRPORT
BRADLEY FIELD
N
1/2
0
1
MILES

other pertinent characteristics of each community planning area, are summarized in Table 9-4. Table 9-5 summarizes vehicle trip data from the Boise area traffic model.

The significance of different emission source categories cannot be fully evaluated solely from the percent contribution columns of Table 9-2 or 9-3. The percent contribution of any source category is, to a major extent, a reflection of the significance of other sources in a particular community planning area. For example, 1980 on- and off-street parking emissions in the Foothills subarea contribute substantially to the ESDI value (Table 9-3). This is largely a reflection of the minimal amount of vehicle traffic in that area, rather than an indication of massive amounts of parking-related emissions (compare Tables 9-2 and 9-3).

Future Air Pollution Potential in Ada County

The implications of projected emission levels have been evaluated using simple proportionality ("rollback") techniques (see Appendix H). Each community planning area has been analyzed as a discrete subarea, without considering the possibility of pollutant transport between areas. The use of such procedures requires selection of a base year from which to extrapolate potential pollution levels. The ambient monitoring data summarized previously show that the 1976-1977 period experienced the most frequent and severe CO episodes yet reported. The 1977-1980 emission increases noted in Table 9-2 are largely attributed to highway traffic. As shown in Tables 9-4 and 9-5, the Boise area traffic model projected a 14.2 percent increase in vehicle trips and a 15.4 percent increase in vehicle miles traveled during the 1977-1980 period. Actual traffic count data do not seem to show such increases during this time period. It remains to be seen whether this recent reduction in per capita vehicle travel will continue significantly into the future. In any event, 1977 data have been used in this EIS as representative of potential CO levels under unfavorable weather conditions.

The procedures used for this analysis have not dealt with the possibility of significant pollutant transport between community planning areas. As discussed in Appendix G, available monitoring data demonstrate only neighborhood scale transport events.

Estimates of future air pollution potential are presented in Table 9-6. Potential CO levels were analyzed as two components: a "background" increment related to total emissions in each planning area, and a roadway corridor

Table 9-4. Community Planning Area Characteristics Reflected in the Emission Inventories and Forecasts

Community Planning Area (CPA #)	Year	Population[1]	Dwelling Units[1]	Total Acreage[1]	Residential Acreage[2]	Roadway Miles[3]	Daily Vehicle Miles Traveled[3]	Daily Home-Based Vehicle Trips[4]
Southeast Area (10)	1977	13,578	4,675	8,503	1,169	20	118,241	34,556
	1980	16,808	5,728	8,503	1,432	22	147,878	43,266
	1987	29,702	10,132	8,503	2,533	33	270,901	80,827
	2000	49,831	17,661	8,503	4,415	33	495,573	148,887
Northwest Subarea (21)	1977	6,327	2,016	3,880	492	11	78,560	14,902
	1980	7,853	2,580	3,880	629	11	92,402	19,488
	1987	14,411	4,810	3,880	1,173	12	153,431	38,371
	2000	24,455	8,465	3,880	2,065	12	229,285	71,362
CBD Subarea (22)	1977	3,178	1,974	1,084	481	22	221,750	14,591
	1980	3,534	2,231	1,084	544	22	257,537	16,852
	1987	4,366	2,765	1,084	674	24	360,418	22,058
	2000	6,655	3,996	1,084	975	24	596,172	33,687
Warm Springs Subarea (23)	1977	3,698	1,372	1,090	335	4	30,569	10,141
	1980	4,003	1,522	1,090	371	4	40,043	11,496
	1987	4,553	1,761	1,090	430	4	57,951	14,048
	2000	5,574	2,261	1,090	551	4	100,696	19,061
Foothills Subarea (24)	1977	7,603	2,400	14,021	2,400	13	24,645	17,740
	1980	8,921	2,869	14,021	2,869	13	31,026	21,671
	1987	12,529	4,105	14,021	4,105	13	71,089	32,747
	2000	18,850	6,389	14,021	6,389	13	143,629	53,861
Northend Subarea (25)	1977	17,458	6,997	2,141	1,707	15	142,791	51,720
	1980	17,874	7,244	2,141	1,767	15	161,512	54,717
	1987	17,957	7,426	2,141	1,811	13	178,029	59,240
	2000	18,110	7,642	2,141	1,864	13	260,063	64,424
West Bench Area (30)	1977	30,276	9,633	11,182	2,752	57	462,544	71,204
	1980	32,640	10,559	11,182	3,017	60	538,089	79,757
	1987	37,565	12,393	11,182	3,541	61	699,132	98,864
	2000	45,115	15,545	11,182	4,441	61	1,102,625	131,049
Central Bench Area (40)	1977	36,749	12,577	6,198	3,930	45	411,511	92,965
	1980	37,716	13,140	6,198	4,106	45	456,623	99,253
	1987	39,248	13,971	6,198	4,366	46	637,459	111,453
	2000	43,355	16,043	6,198	5,013	46	843,049	135,247
Southwest Area (50)	1977	10,277	3,001	18,383	2,308	69	271,411	22,182
	1980	12,072	3,608	18,383	2,775	69	313,706	27,253
	1987	14,914	4,652	18,383	3,578	69	472,042	37,111
	2000	22,380	7,513	18,383	5,779	69	800,122	63,337
Subtotal, Boise Metropolitan Area	1977	129,144	44,644	66,482	15,574	256	1,762,022	329,995
	1980	141,427	49,481	66,482	17,510	261	2,038,816	373,753
	1987	175,244	62,016	66,482	22,211	275	2,900,452	494,728
	2000	234,050	85,516	66,482	31,492	275	4,571,214	720,925

Table 9-4 (cont'd.)

Community Planning Area (CPA #)	Year	Population[1]	Dwelling Units[1]	Total Acreage[1]	Residential Acreage[2]	Roadway Miles[3]	Daily Vehicle Miles Traveled[3]	Daily Home-Based Vehicle Trips[4]
Meridian Area (60)	1977	7,295	2,341	10,560	780	28	111,456	17,304
	1980	8,593	2,708	10,560	903	28	127,620	20,394
	1987	12,639	4,060	10,560	1,353	25	129,427	32,388
	2000	22,122	7,567	10,560	2,522	25	235,621	63,792
Eagle Area (70)	1977	3,152	1,066	9,728	355	9	36,810	7,880
	1980	3,800	1,284	9,728	428	9	42,199	9,699
	1987	5,696	1,926	9,728	642	12	77,992	15,365
	2000	10,225	3,497	9,728	1,166	12	122,956	29,481
Kuna Area (80)	1977	1,626	494	3,520	165	9	5,791	3,651
	1980	2,004	608	3,520	203	9	7,082	4,593
	1987	3,301	1,025	3,520	342	9	11,296	8,177
	2000	6,415	2,101	3,520	700	9	20,265	29,675
Rural Ada County Area (90)	1977	8,507	2,668	335,598	2,668	234	379,333	19,721
	1980	9,393	2,988	335,598	2,988	234	433,013	22,570
	1987	11,794	3,819	335,598	3,819	224	533,280	30,466
	2000	15,913	5,278	335,598	5,278	224	837,644	44,495
Total, Northern Ada County	1977	149,724	51,213	425,888	19,542	536	2,295,412	378,551
	1980	165,211	57,069	425,888	22,032	541	2,648,730	431,069
	1987	208,674	72,847	425,888	28,367	545	3,652,447	581,132
	2000	289,000	103,958	425,888	41,158	545	5,787,700	876,396

Notes and Sources:

[1] Tabulated from data in APA 1978, reflecting traffic zone aggregations as used in the Boise traffic model.

[2] Calculated from dwelling unit values assuming 4.0 units per acre in CPA 10; 4.1 units per acre in CPAs 21, 22, 23, and 25; 1.0 unit per acre in CPAs 24 and 90; 3.5 units per acre in CPA 30; 3.2 units per acre in CPA 40; 1.3 units per acre in CPA 50; and 3.0 units per acre in CPAs 60, 70, and 80. Dwelling unit per acre values selected by Jones & Stokes Associates staff based on data in APA 1978.

[3] From Boise traffic model output; computer runs made in November 1980.

[4] Calculated for each CPA using areawide average trip generation rates; areawide trip generation rates calculated separately for each forecast year from traffic model output of total home-based vehicle trips and total dwelling units listed above. All vehicle trip numbers represent sum of trips in both directions. Values are preliminary estimates, subject to revision when specific CPA summaries become available directly from the traffic model.

Table 9-5. Summary of Average Weedkay Vehicle Trip Characteristics From the Boise Traffic Model

	Trip Type					Total Trips
	HBW	HBO	NHB	PI-AX	PX-AI	
			1977			
Vehicle Trips	102,213	269,247	143,357	7,090	27,790	549,697
Percent of Total Trips	18.6	49.0	26.1	1.3	5.1	100.1
Average Trip Duration (minutes)	12.07	10.15	8.62	29.94	32.49	11.82
Percent of Trips Completed Within 7 Minutes	18.2	36.6	49.2	0.2	0.0	33.6
Percent of Total Travel Time Within 7 Minutes of Trip Start	66.2	75.8	82.6	28.6	22.9	71.7
Mean Vehicle Trips per Household	2.00	5.26	2.80	0.14	0.54	10.74
			1980			
Vehicle Trips	116,844	307,126	165,045	8,099	30,624	627,738
Percent of Total Trips	18.6	48.9	26.3	1.3	4.9	100.0
Average Trip Duration (minutes)	12.24	10.23	8.64	29.91	32.44	11.84
Percent of Trips Completed Within 7 Minutes	17.6	36.3	49.7	0.2	0.0	33.6
Percent of Total Travel Time Within 7 Minutes of Trip Start	65.4	75.4	82.6	28.8	23.1	71.5
Mean Vehicle Trips per Household	2.05	5.39	2.89	0.14	0.54	11.01
			1987			
Vehicle Trips	159,293	410,837	228,699	11,002	38,423	848,254
Percent of Total Trips	18.8	48.4	27.0	1.3	4.5	100.0
Average Trip Duration (minutes)	12.81	10.57	8.76	29.89	32.46	12.04
Percent of Trips Completed Within 7 Minutes	16.1	34.5	50.6	0.3	0.0	32.9
Percent of Total Travel Time Within 7 Minutes of Trip Start	63.1	73.9	82.2	28.9	23.2	70.5
Mean Vehicle Trips per Household	2.19	5.64	3.14	0.15	0.53	11.65
			2000			
Vehicle Trips	243,157	616,480	357,011	16,757	53,022	1,286,427
Percent of Total Trips	18.9	47.9	27.8	1.3	4.1	100.0
Average Trip Duration (minutes)	13.38	10.96	8.76	29.69	32.39	12.21
Percent of Trips Completed Within 7 Minutes	14.7	32.8	52.3	0.3	0.0	32.6
Percent of Total Travel Time Within 7 Minutes of Trip Start	61.0	72.1	82.2	29.1	23.2	69.7
Mean Vehicle Trips per Household	2.35	5.96	3.45	0.16	0.50	12.43

Notes: Based on traffic model runs made in December 1980. Vehicle occupancy assumptions: HBW, HBO, and NHB @ 1.33; PI-AX and PX-AI @ 1.67. "Trips" represent "l-way travel events"; a "round trip" counts as two trips.

Trip type definitions:

HBW = home-based work trips
HBO = home-based other trips
NHB = nonhome-based trips
PI-AX = production internal, attraction external (to northern Ada County)
PX-AI = production external, attraction internal (to northern Ada County)

Table 9-6. Forecasts of Air Pollution Potential

Community Planning Area (CPA #)	Emission Forecast Basis	Potential 8-Hour Carbon Monoxide Levels (ppm) 1977	1980	1987	2000
Southeast Area (10)	10 am-6 pm	10.2	12.4	11.5	12.0
	Daily Total	10.2	12.5	11.4	11.4
Northwest Subarea (21)	10 am-6 pm	10.8	12.7	11.2	8.2
	Daily Total	10.8	12.7	11.1	8.9
CBD Subarea (22)	10 am-6 pm	18.3	21.0	15.7	14.1
	Daily Total	18.3	21.0	15.5	13.3
Warm Springs Subarea (23)	10 am-6 pm	12.0	15.2	11.8	12.1
	Daily Total	12.0	15.1	11.5	11.3
Foothills Subarea (24)	10 am-6 pm	4.3	5.2	6.0	6.3
	Daily Total	4.3	5.3	5.8	6.0
Northend Subarea (25)	10 am-6 pm	14.1	15.8	9.5	8.2
	Daily Total	14.1	15.8	9.4	7.8
West Bench Area (30)	10 am-6 pm	18.9	22.1	15.3	13.3
	Daily Total	18.9	22.2	15.0	12.7
Central Bench Area (40)	10 am-6 pm	21.0	23.1	17.2	11.8
	Daily Total	21.0	23.1	16.8	11.4
Southwest Area (50)	10 am-6 pm	10.3	11.7	9.5	9.6
	Daily Total	10.3	11.8	9.2	8.9
Meridian Area (60)	10 am-6 pm	7.5	8.4	4.6	4.7
	Daily Total	7.5	8.5	4.5	4.6
Eagle Area (70)	10 am-6 pm	5.0	5.7	5.5	4.9
	Daily Total	5.0	5.7	5.4	4.7
Kuna Area (80)	10 am-6 pm	1.4	1.7	1.4	1.4
	Daily Total	1.4	1.7	1.4	1.4
Rural Ada County Area (90)	10 am-6 pm	2.9	3.3	2.3	1.8
	Daily Total	2.9	3.3	2.2	1.7

NOTES AND SOURCES:

Forecasts prepared using simple proportionality ("rollback") procedures, with "background" CO increment proportional to change in total CPA emissions and "corridor" CO increment proportional to change in highway plus nonresidential parking emissions for CPA. Each CPA treated separately (no pollutant transport between CPAs).

1977 used as a uniform base year, since that year showed the highest ratios of observed CO levels to estimated emissions.

"Background" and base year ambient CO values for each CPA shown in Table 9-7. Emission estimates and forecasts shown in Table 9-2.

ppm = parts per million, by volume.

increment related to highway traffic and nonresidential parking emissions. Table 9-6 makes it clear that CO problems can be expected to persist at least to the year 2000 in several portions of the Boise metropolitan area. The effects of existing vehicle emission control requirements are accounted for in the emission forecasts used for this analysis.

Table 9-7 summarizes the assumptions used in this analysis regarding 1977 background CO increments and overall 8-hour CO levels. Background CO values for the CBD area were selected after reviewing the hourly CO data for the downtown monitoring station. Background CO values for other planning areas were selected on the basis of other monitoring data and the emission source density index values for 1977. Base year ambient CO values for each planning area were developed separately for valley and bench areas. Data from the downtown monitoring station were used for valley areas. The second-highest 8-hour CO episode for 1977 (18.3 ppm) was assigned to the CBD area. Base year CO values for other planning areas were extrapolated from this on the basis of emission source density index values. A similar procedure was used for the bench areas. The second highest 8-hour CO event reported from the Idaho Air Quality Bureau special CO study (21.0 ppm) was assigned to the central bench planning area. Emission source density index values were used to extrapolate base year CO values for other planning areas.

The Southeast area (CPA 10) deserves some special discussion. The Idaho Air Quality Bureau special study reported an 8-hour CO value of 17.7 ppm from a site along Broadway Avenue. This is substantially higher than the 10.2 ppm CO value assigned to this planning area in Table 9-8. The 10.2 ppm value seems quite reasonable for most of the Southeast area. Interpretation of the analyses presented in this chapter should recognize that the portion of the Southeast area near Broadway Avenue may have a more serious air quality problem than indicated. Except for this one situation, the base year CO values assigned in Table 9-7 are in agreement with all available ambient monitoring data.

Effects of Altered Population Distributions

The analyses presented above are based on the population distributions incorporated into the Boise area traffic model and the 1978 Demographic and Employment Distribution report (APA 1978). Recent wastewater management planning has been based on lower population growth in the Southwest area and higher growth in the Eagle area (see Chapter 5). The air quality implications of this altered population distribution have been evaluated using trip origin-destination data from the Boise area traffic model.

Table 9-7. Base Year (1977) Air Quality Values Used for Rollback Analyses

Community Planning Area (CPA #)	Background CO (ppm)	Total Ambient CO (ppm)	Emission Source Density Index
Southeast Area (10)	1.0	10.2	156.93
Northwest Subarea (21)	1.0	10.8	166.65
CBD Subarea (22)	2.0	18.3	281.58
Warms Springs Subarea (23)	1.5	12.0	184.72
Foothills Subarea (24)	0.5	4.3	65.62
Northend Subarea (25)	2.0	14.1	216.40
West Bench Area (30)	1.5	18.9	189.63
Central Bench Area (40)	2.0	21.0	210.40
Southwest Area (50)	1.0	10.3	103.29
Meridian Area (60)	0.5	7.5	75.44
Eagle Area (70)	0.5	5.0	76.83
Kuna Area (80)	0.1	1.4	14.39
Rural Ada County Area (90)	0.1	2.9	29.47

NOTES AND SOURCES:

10 am-6 pm Emission Source Density Index (ESDI) values from Table 9-3.

Total ambient CO value for CPA 22 is second high 8-hour average for 1977 as reported by the Ninth Street monitoring station.

Total ambient CO value for CPA 40 is the second high 8-hour average reported by the Idaho Air Quality Bureau special study in 1977-1978 (Idaho Air Quality Bureau 1978).

Ambient CO values for CPAs 10, 21, 23, 24, 25 and 70 calculated from value for CPA 22, based on relative ESDI values.

Ambient CO values for CPAs 30, 50, 60, 80, and 90 calculated from value for CPA 40, based on relative ESDI values.

Background CO values assigned on a judgmental basis following inspection of hourly CO values at the Ninth Street monitoring station and comparison of ESDI values by CPA.

Traffic model output was obtained summarizing the destination patterns for all trips originating in each community planning area. The trip patterns for the Southwest and Eagle areas were then adjusted, assuming that adjusted trip numbers would be proportional to the change in planning area population. Results for 1987 show a 6.3 percent reduction (3,937 trips) for the Southwest area and a 27.1 percent increase (4,114 trips) for the Eagle area. The net change in travel patterns is minimal for most planning areas. Total trip arrivals (trip destinations) increase by 9.8 percent for the Eagle area, 0.75 percent for the Northwest area, and 0.35 percent for rural Ada County. Trip arrivals decrease by 1.4 percent for the Southwest area, 0.42 percent for the Southeast area, 0.40 percent for the Central Bench, and 0.17 percent for the Kuna area. All other community planning areas show virtually no change in 1987 trip patterns. None of these changes are likely to produce significant air quality effects.

Results for the year 2000 are generally similar. Trips originating in the Southwest area decrease by 14.5 percent (14,917 trips) while trips originating in the Eagle area increase by 29.6 percent (8,808 trips). Trip arrivals increase by 11.2 percent for the Eagle area and by 0.73 percent for the Northwest area. All other community planning areas show a net reduction in trip arrivals (3.9 percent for the Southwest area, 1.2 percent for the Central Bench, 1.1 percent for the Southeast area, etc.).

Required Emission Reductions

The procedures used to develop Table 9-6 have also been used to estimate the extent of emission reduction which would be necessary to predict attainment of the federal 8-hour CO standard in each of the four analysis years (Table 9-8). To meet the 1987 deadline established by the Clean Air Act, projected 1987 emissions must be reduced by as much as 53 percent in some community planning areas. The greatest emission reduction requirements for the 1987 period apply to the Central Bench, CBD, and West Bench community planning areas. The extent of emission reduction requirements for 1987 and 2000 are shown in Figures 9-14 and 9-15.

Emission reduction requirements have been estimated separately for each community planning area because of the spatially limited nature of CO problems (relatively close to major roadways and parking areas). Measures to achieve required emission reductions, however, will not always be so restricted in geographic scope. The traffic producing

Table 9-8. Reductions From Projected CPA Emissions Required To Indicate Attainment of 8-Hour CO Standard

Community Planning Area (CPA#)	Emission Forecast Basis	Required Percent Reduction From Projected Emissions			
		1977	1980	1987	2000
Southeast Area (10)	10 am-6 pm	13.04	30.64	24.55	28.53
	Daily Total	13.04	30.82	23.70	24.57
Northwest Subarea (21)	10 am-6 pm	18.37	32.33	21.67	0.0
	Daily Total	18.37	32.47	21.17	0.0
CBD Subarea (22)	10 am-6 pm	57.06	64.50	47.92	40.57
	Daily Total	57.06	64.19	47.47	36.83
Warm Springs Subarea (23)	10 am-6 pm	28.57	46.30	27.12	29.59
	Daily Total	28.57	46.11	25.03	23.74
Foothills Subarea (24)	10 am-6 pm	0.0	0.0	0.0	0.0
	Daily Total	0.0	0.0	0.0	0.0
Northend Subarea (25)	10 am-6 pm	42.15	49.90	6.04	0.0
	Daily Total	42.15	49.75	5.47	0.0
West Bench Area (30)	10 am-6 pm	56.90	64.45	44.85	35.42
	Daily Total	56.90	64.43	43.92	32.36
Central Bench Area (40)	10 am-6 pm	63.16	67.44	52.89	26.83
	Daily Total	63.16	67.36	51.78	23.77
Southwest Area (50)	10 am-6 pm	13.98	25.93	5.38	6.71
	Daily Total	13.98	25.95	2.61	0.0
Meridian Area (60)	10 am-6 pm	0.0	0.0	0.0	0.0
	Daily Total	0.0	0.0	0.0	0.0
Eagle Area (70)	10 am-6 pm	0.0	0.0	0.0	0.0
	Daily Total	0.0	0.0	0.0	0.0

Table 9-8 (cont'd.)

Community Planning Area (CPA#)	Emission Forecast Basis	Required Percent Reduction From Projected Emissions			
		1977	1980	1987	2000
Kuna Area (80)	10 am-6 pm	0.0	0.0	0.0	0.0
	Daily Total	0.0	0.0	0.0	0.0
Rural Ada County (90)	10 am-6 pm	0.0	0.0	0.0	0.0
	Daily Total	0.0	0.0	0.0	0.0

Notes and Sources:

Based on proportionality (rollback) procedures discussed in text.

Supporting emission forecasts presented in Table 9-2.

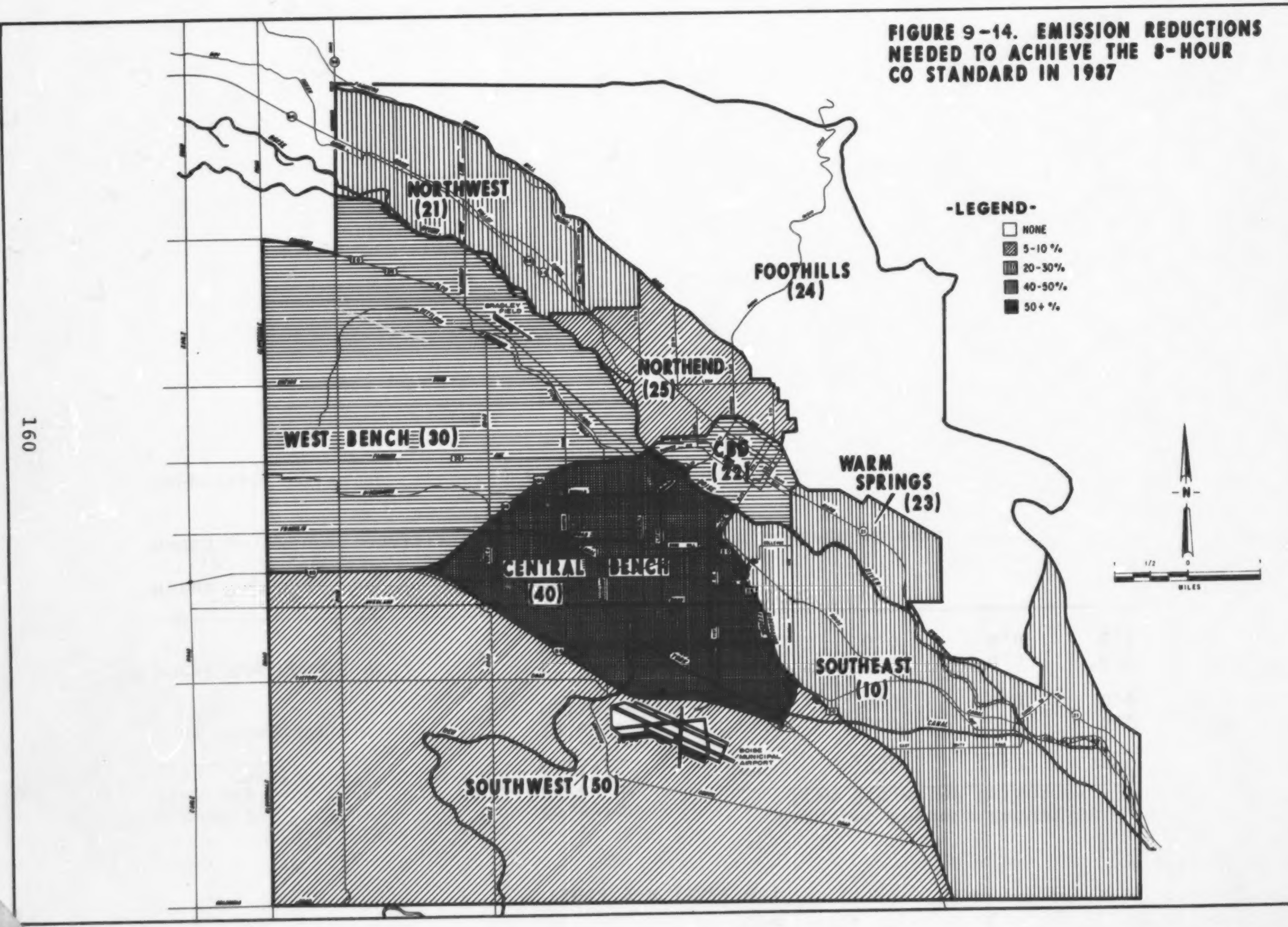

-LEGEND-
☐ NONE
▨ 5-10 %
▥ 20-30%
▦ 40-50%
■ 50+ %
NORTHWEST (21)
FOOTHILLS (24)
NORTHEND (25)
CBD (22)
WARM SPRINGS (23)
WEST BENCH (30)
CENTRAL BENCH (40)
SOUTHEAST (10)
SOUTHWEST (50)
BRADLEY FIELD
BOISE MUNICIPAL AIRPORT
-N-
1/2
0
MILES

FIGURE 9-14. EMISSION REDUCTIONS NEEDED TO ACHIEVE THE 8-HOUR CO STANDARD IN 1987

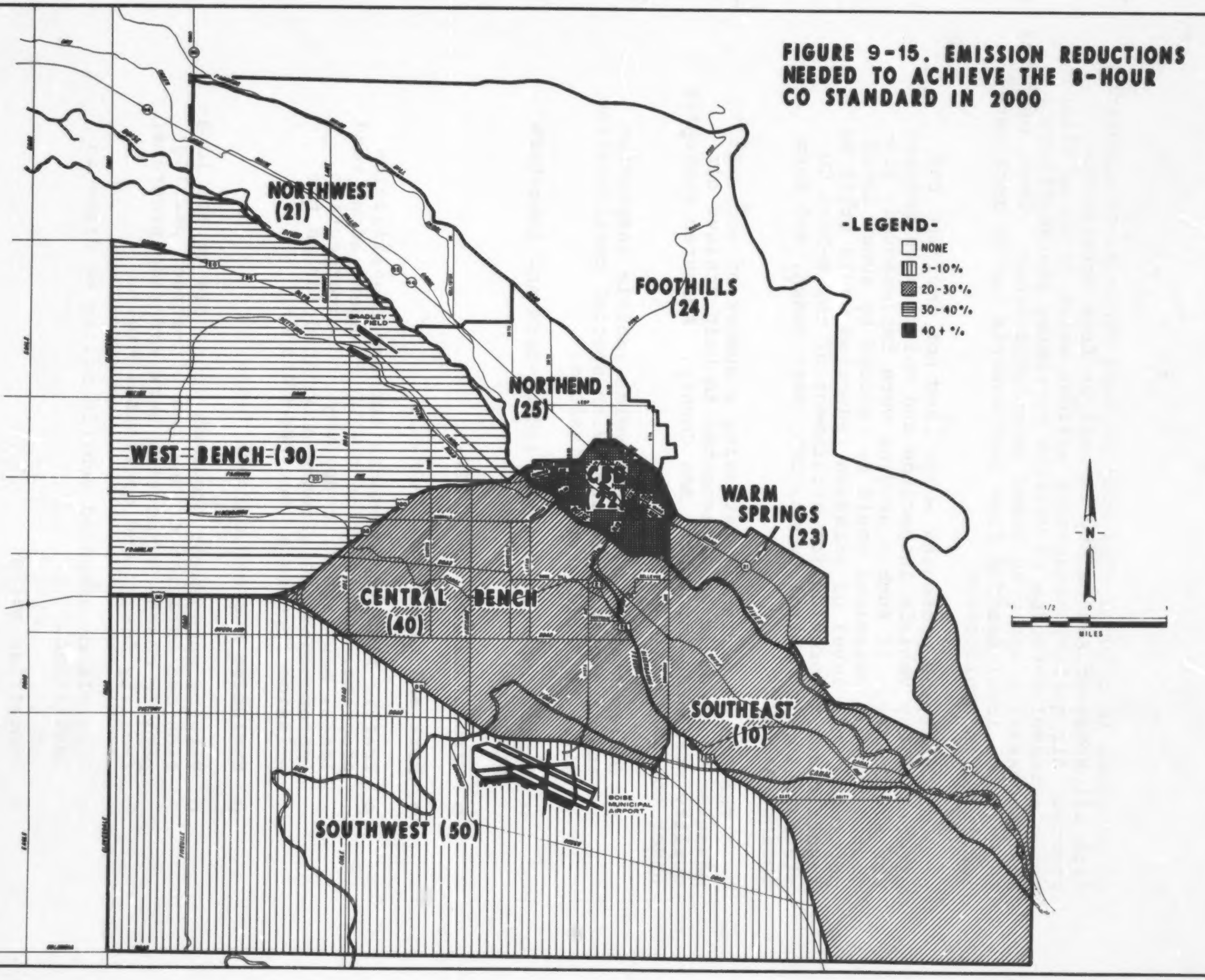

NORTHWEST
(21)
FOOTHILLS
(24)
NORTHEND
(25)
(22)
WARM
SPRINGS
(23)
WEST BENCH (30)
CENTRAL BENCH
(40)
SOUTHEAST
(10)
SOUTHWEST (50)
BRADLEY FIELD
BOISE MUNICIPAL AIRPORT
-LEGEND-
☐ NONE
▥ 5-10%
▨ 20-30%
▤ 30-40%
■ 40+%
N
1
1/2
0
1
MILES

FIGURE 9-15. EMISSION REDUCTIONS NEEDED TO ACHIEVE THE 8-HOUR CO STANDARD IN 2000

CO problems in a local area will include vehicles originating from all areas of Ada County as well as from outside the county. Air quality management actions which focus on altering vehicle travel patterns or vehicle operating characteristics must necessarily apply to broad geographic areas. Those measures focusing on local traffic flow improvements can be much more localized in application.

The analyses presented above have not included the effects of any vehicle inspection and maintenance program for Ada County. If such a program were implemented, projected vehicle emissions would be reduced by about 20-25 percent. This level of emission reduction would still be insufficient to provide for attainment of the 8-hour CO standard in the Central Bench, CBD, West Bench, and Warm Springs areas.

The APA is currently reviewing a number of air quality measures which could be implemented to help achieve air quality standards throughout Ada County. Measures currently under consideration include:

- Implementation of a countywide vehicle inspection and maintenance program, with special consideration given to "cold start" emissions.
- Improved public transit (short-term and long-term programs).
- Carpool/vanpool programs.
- Park and ride facilities.
- Traffic flow improvements through signalization programs, intersection design changes, added road lanes; many specific roadway and intersection improvements are already accounted for in the emission forecasts (see Appendix A).
- Exclusive bus and carpool lanes.
- Parking management programs (controls on the location and duration of on- and off-street parking; parking costs; supporting park and ride programs; facility design and operation; etc.).
- Controls on extended vehicle idling at drive-in facilities.
- Pedestrian malls.

- Improved bicycle facilities.
- Employer actions to support transit, carpool/vanpool programs, bicycle usage, flexible work schedules, etc.
- Planning programs to assist in implementing measures on an individual development project basis.

State Implementation Plan Consistency

Expanded wastewater treatment plant capacity for the City of Boise and the ESD will accommodate additional urban development. As mentioned previously, the federal Clean Air Act requires that federal funding programs not be used to support projects which are inconsistent with air quality management programs identified in State Implementation Plans. (SIP). The SIP provides the framework for achieving and maintaining federal air quality standards.

SIP revisions for Ada County were submitted to EPA in January and July 1980. In October 1980 EPA approved three aspects of the revised SIP:

- The 1979 transportation control plan portion of the carbon monoxide attainment plan.
- A variance from state indirect source review requirements for the Boise Redevelopment Agency's City Center Project.
- An extension of the CO attainment deadline from December 31, 1982 to December 31, 1987.

EPA also required that an additional SIP revision for Ada County be submitted by July 1, 1981. This SIP revision is to provide commitments to, and a schedule for establishing, an effective vehicle inspection and maintenance program. In addition, the normal updating of the SIP (in 1982) must include revised emission inventories and forecasts, revised analyses of required emission reductions, and a demonstration that "reasonable further progress" is being made toward achieving the federal CO standards. The revised emission inventories and forecasts must incorporate anticipated highway and redevelopment projects.

The emission inventory and forecasting procedures described in Appendix A have been developed to meet the types of requirements noted above. The initial application of these procedures has been discussed previously in this chapter. These emission forecasts were prepared using the same population forecasts which served as a basis for the Boise wastewater treatment facility plan.

The facility plan for the ESD has been based on a population forecast which is about 30 percent greater than the forecast incorporated into the emission projections. The analysis presented elsewhere in this chapter, however, indicates that such additional development in the Eagle area would probably not lead to new or aggravated CO problems in northern Ada County.

Chapter 10

GROUNDWATER RESOURCES

Geology

A brief discussion on geology and groundwater hydrology is presented in this section. More detailed information on these topics is included in groundwater and nonpoint source waste loading reports (H. Esmaili & Associates 1980) available in the EPA office in Boise.

Regional Geology

The regional geology of the Boise Valley is depicted in Figure 10-1A which shows a generalized geologic cross section of the western Snake River Plain. The western Snake River Plain is underlain by a wide, structural trough in the granitic Idaho batholith. This basin contains a section of upper Cenozoic strata several thousand feet thick, composed primarily of sediment and volcanics of the Idaho Group. The stratigraphy of the Idaho Group has been classified by Malde and Powers (1962). Overlying the eroded surface of the Idaho Group is a relatively recent and thin sequence of basalt and sediments into which the Boise Valley has cut. A generalized section of the shallow geology beneath the Boise Valley is shown in Figure 10-1B.

Geology of Study Area

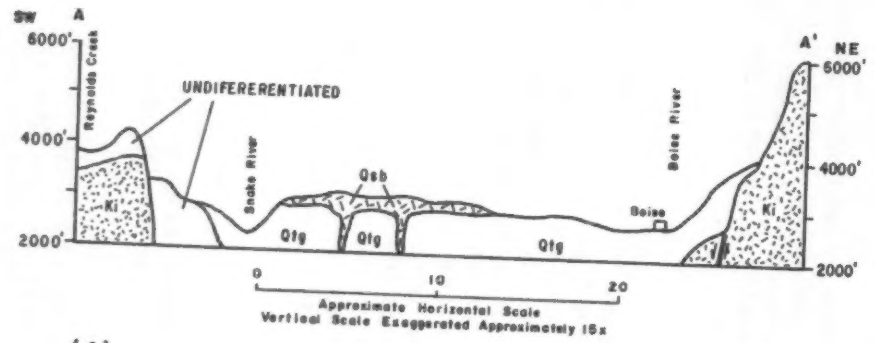
Figure 10-2 is a map of the study area geology as shown by Dion. Following is a brief description of the geologic units exposed in the study area.

The Idaho batholith outcrops at the upper elevations of the Northern Highland and extensively in the Eastern Upland. The granitic batholith is generally regarded as being essentially impermeable, although considerable volumes of water are contained locally and discontinuously in fractures and weathered zones. The fault-bounded batholith plunges deeply beneath the Boise Valley to the southwest, forming the lower limit of the groundwater system.

The unit of the Idaho Group which underlies the Boise Valley is the Glenns Ferry Formation of late Pliocene and early Pleistocene age. It has a thickness of about 2,000 feet beneath the Boise Valley, outcrops extensively along the Boise Front, and underlies much of the valley at relatively shallow depths. Its stratigraphic subunits range in texture from clay to fine gravel, include some volcanic ash and lava flows, and are of highly variable thickness and extent. Bedding of the Glenns

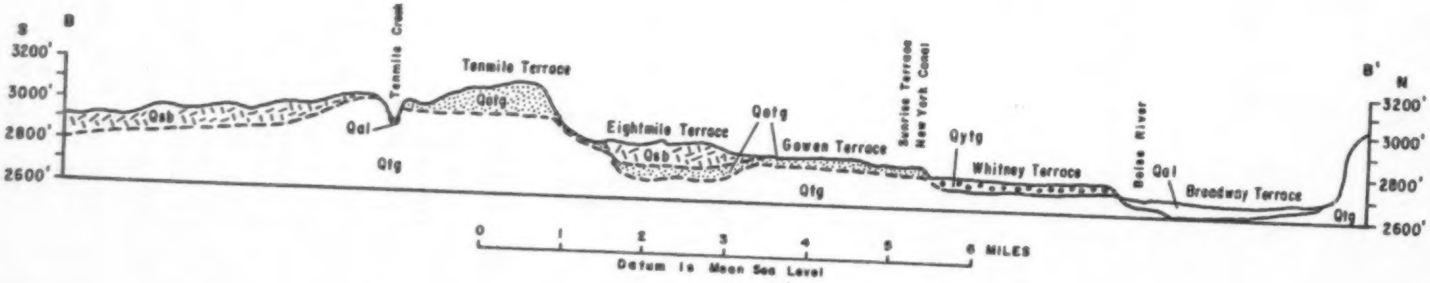
FIGURE 10-1

GENERALIZED GEOLOGIC CROSS SECTIONS OF BOISE VALLEY


SW
A
6000'
4000'
2000'
Reynolds Creek
UNDIFERERENTIATED
Ki
Snake River
Qsb
Qtg
Qtg
Qtg
Boise River
Boise
Ki
A'
NE
6000'
4000'
2000'
0
10
20
Approximate Horizontal Scale
Vertical Scale Exaggerated Approximately 15x

(A)

(AFTER MALDE AND POWERS, 1962)
Esmali 1980


S
B
3200'
3000'
2800'
2600'
Qsb
Tenmile Creek
Qal
Qtg
Tenmile Terrace
Qotg
Eightmile Terrace
Qsb
Qotg
Gowen Terrace
Sunrise Terrace
New York Canal
Qytg
Whitney Terrace
Qtg
Boise River
Qal
Broadway Terrace
Qtg
B'
N
3200'
3000'
2800'
2600'
0
1
2
3
4
5
6 MILES
Datum is Mean Sea Level

(B)

(AFTER NACE Etal, 1957)

- LEGEND -

☐ Qal - ALLUVIUM - CLAY, SILT, SAND & GRAVEL

▨ Qytg - LATE TERRACE GRAVEL - CHIEFLY MEDIUM-GRAINED TO COARSE GRAVEL W/SOME SAND, SILT & CLAY

▨ Qsb - SNAKE RIVER BASALT - GRAY TO BLACK VESICULAR BASALT

▨ Qotg - EARLY TERRACE GRAVEL - CHIEFLY COARSE GRAVEL W/SOME SAND

☐ Qtg - GLENNS FERRY FORMATION

▨ Ki - GRANITE OF IDAHO BATHOLITH

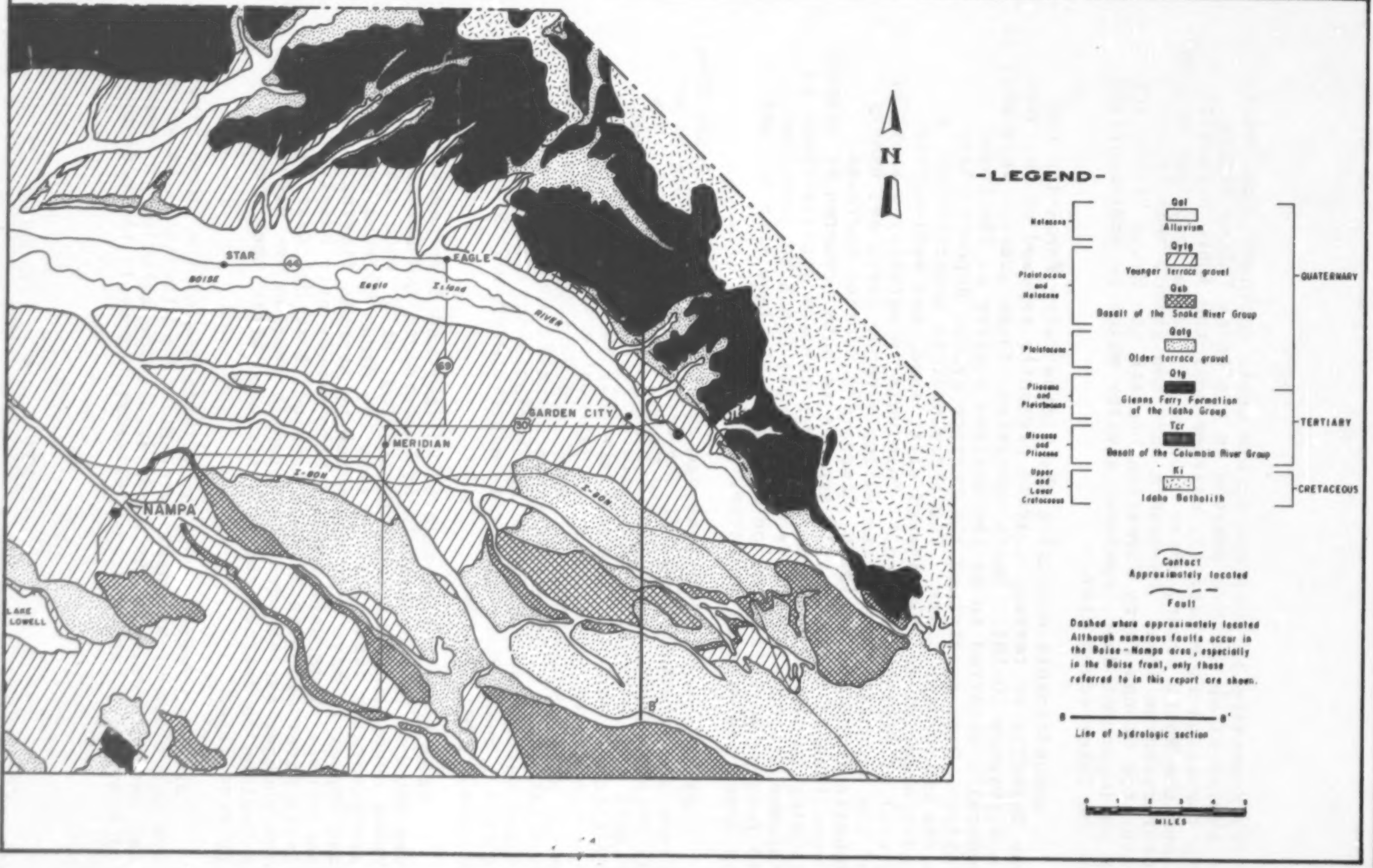

N
-LEGEND-
Holocene
Qal
Alluvium
Pleistocene and Holocene
Qytg
Younger terrace gravel
Qsb
Basalt of the Snake River Group
Pleistocene
Qotg
Older terrace gravel
Pliocene and Pleistocene
Qtg
Glenns Ferry Formation of the Idaho Group
Miocene and Pliocene
Tcr
Basalt of the Columbia River Group
Upper and Lower Cretaceous
Ki
Idaho Batholith
QUATERNARY
TERTIARY
CRETACEOUS
Contact
Approximately located
Fault
Dashed where approximately located
Although numerous faults occur in the Boise-Nampa area, especially in the Boise front, only those referred to in this report are shown.
B
B'
Line of hydrologic section
0
1
2
3
4
5
MILES
STAR
EAGLE
44
BOISE
Eagle
Island
RIVER
55
GARDEN CITY
30
MERIDIAN
I-80N
NAMPA
LAKE LOWELL

FIGURE 10-2. GENERALIZED GEOLOGIC MAP OF THE BOISE-NAMPA AREA

Ferry Formation is inclined to the west, southwest, and south at angles of up to five degrees in the Boise Valley region. The formation is relatively coarser near the Idaho batholith along the Boise Front; where exposed, it is an important groundwater recharge area. Permeable sand and gravel beds in the saturated Glenns Ferry Formation beneath the Boise Valley act as an important deep, regional aquifer which is semi-confined by the interbedded clay.

Unconformably overlying the Glenns Ferry Formation are the deposits of terrace gravels presently exposed at the surface (Figure 10-1B). Where saturated, these gravels form what is generally referred to as the shallow aquifer of the Boise Valley. Dion subdivided the terrace gravel deposits into older and younger units. The older unit is described as "a thick sheet of unconsolidated silt, sand, and well-sorted gravel of Pleistocene age." This unit is actually a grouping of the deposits forming the valley's upper terraces, namely Tenmile Bench and Meridian, Gowen, and Sunrise terraces. Deposition of these gravels appears to have occurred by streams flowing to the southwest. The older terrace gravels range in thickness from over 100 feet on Tenmile Bench to less than 80 feet on Meridian Terrace and generally less than 50 feet on Gowen and Sunrise terraces.

Pleistocene to Holocene-age basalt flows of the Snake River Group are interbedded within the older terrace gravels as well as occurring directly over the Glenns Ferry Formation. The basalt flow exposed on Eightmile Terrace is as much as 100 feet thick. It overlies approximately 40 feet of the older terrace gravel. Basalt is exposed most extensively in the study area south of Tenmile Bench and Meridian Terrace. Maximum thickness of basalt in these areas is about 150 feet. Where saturated, the basalt has variable aquifer characteristics. Snake River basalt is exposed over nearly the entire Mountain Home Plateau.

Underlying the surface of Whitney and Star terraces are the younger terrace gravels of Pleistocene and Holocene age. These deposits of unconsolidated clay, silt, sand, and gravel, are generally finer grained than the older terrace gravels, and appear to have been deposited by streams flowing to the northwest. This unit forms a thin veneer over basalt of the Snake River Group in a large area south of Meridian Terrace. The younger terrace gravels directly overlie the Glenns Ferry Formation on Whitney and Star terraces where they are up to 50 feet thick.

Broadway Terrace and the tributaries of the Boise River are underlain by unconsolidated Holocene alluvium, the youngest geologic unit in the study area. The alluvium is composed of silt, sand, and coarse, well-sorted gravel; these deposits directly overlie the Glenns Ferry Formation, and have a maximum thickness of 50 feet. Extensive caliche development has occurred in the alluvium and both of the terrace gravel units, as much as 10 feet thick in some areas.

Groundwater Hydrology

The Boise Valley has a unique and plentiful groundwater resource due to the large potential storage capacity of the recent sediments, the annual availability of large volumes of surface water from the Eastern Upland, the distribution of this water for recharge by way of the irrigation system, and the occurrence of 2,000 feet of saturated Glenns Ferry Formation at depth.

Boise Valley Aquifers

Previous studies have described the Boise Valley as generally having two groundwater systems--deep and shallow. The deep groundwater system occurs completely within the Glenns Ferry Formation. The terrace gravels, basalts of the Snake River Group, Holocene alluvium, and upper portions of the Glenns Ferry Formation comprise the shallow system.

The existence of a deep aquifer within the Glenns Ferry Formation that is relatively separate from the shallow, water-table aquifer is made evident by the difference in water levels in wells perforated at varying depths. Water levels in the relatively deep wells of the Boise Valley are observed to be both above and below the level of the shallow water table. The saturated thickness of recent sediments and basalt in the study area range from as little as 10 feet to usually not more than 50 feet.

The boundary between the shallow and deep aquifers within the Glenns Ferry Formation is a gradual and poorly defined one. Nevertheless, the cumulative effect of the occurrence of interbedded fine-grained materials within the Glenns Ferry Formation is a significant reduction in vertical hydraulic conductivity. In other words, groundwater deep within the Glenns Ferry Formation, although in physical continuity with the shallower groundwater, is being recharged and discharged in quite a different manner from the near surface groundwater.

Wells with static water levels characteristically different from those tapping the shallow, water-table aquifer are ordinarily perforated at depths in excess of 300 feet, although similar wells with shallower depths are not uncommon. Artesian or free-flowing wells are generally located on Broadway, Star and Meridian Terraces. Along the Boise River there are free-flowing wells as shallow as 100 feet.

Deep wells exhibiting water levels below the shallow groundwater table occur primarily in the area of the upper terraces where seasonal, irrigation-related recharge has raised the water table to exceptionally high levels.

The saturated shallow aquifer of the Boise Valley formed artificially as the result of agricultural development. Because irrigation with Boise River water is not conducted south and east of the study area, the level of the shallow groundwater body rapidly drops to that of the deep groundwater system. Within the study area, the shallow aquifer contains a principal shallow groundwater system as well as several bodies of perched groundwater.

The shallow groundwater system is made up of five aquifer units: the older terrace gravels, basalts of the Snake River Group, younger terrace gravels, Holocene alluvium, and upper portions of the Glenns Ferry Formation. With the exception of the Glenns Ferry Formation, the components of the shallow groundwater system act as a single hydrologic unit because groundwater flow in this system is not significantly altered at formation interfaces. However, each aquifer unit has a differing range of hydraulic characteristics.

Groundwater Occurrence and Flow

The configuration of the groundwater surface in the Boise Valley is unusually complex, reflecting the high rate of recharge into the shallow aquifer by diverted Boise River irrigation water. The primary factors affecting the flow and occurrence of groundwater in the Boise-Ada County Study Area include: (1) the exceptionally high volume of recharge resulting from leakage along the New York Canal, (2) the near uniform distribution of groundwater recharge elsewhere in the study area due to irrigation and conveyance losses, and (3) the irregular surface of the relatively less permeable Glenns Ferry Formation buried beneath the Boise Valley. Additionally, groundwater is significantly influenced by bodies of buried basalt and the system of artificial drains on the lower terraces.

The configuration of the groundwater-elevation contours in the southwest Boise area is dominated by the influence of recharge from the New York Canal. The highest groundwater elevation in the study area, 2,750 feet above sea level, occurs beneath the New York Canal on Eightmile Terrace. The New York Canal and other irrigation-related sources of recharge to the west combine to produce a broad, high mound of shallow groundwater throughout the Boise Valley. East of the New York Canal, recharging groundwater descends quickly to the level of the deep groundwater system.

Within the Southwest Boise study area, high shallow groundwater levels occur primarily beneath Broadway, Star Whitney, Gowen, Sunrise, and Eightmile terraces. This area is heavily irrigated and criss-crossed with leaky irrigation canals and laterals. The resulting recharge saturates a significant depth of the terrace gravels and alluvium. The unusually intricate groundwater-level contours on Whitney and Broadway terraces indicate the intersection of the seasonal-high water table with the network of drainage canals and laterals. To the extent that these drains are effective, they serve to flatten the peak of the seasonal rise in the shallow, near-surface water table.

The surface of the shallow groundwater system continues beneath Meridian Terrace at elevations similar to the groundwater of the lower terraces but at greater depths with respect to the land surface. Beneath and south of Tenmile Bench and south of Meridian Terrace, the groundwater surface declines to the level of the deep groundwater system.

The manner and extent to which bodies of perched groundwater in the study area become continuous with the relatively deeper groundwater system is unclear. However, zones of perched groundwater appear to roughly coincide with broadly spaced water-level contours of the principal groundwater system in both the upper and lower terrace areas. This suggests an eventual merging of the perched groundwater into the main system.

Groundwater flow. Groundwater flow patterns are distinct for the shallow and deep aquifers. The deep groundwater system flows from its source of recharge along the Boise Front, Boise River, and Boise Valley in general, to the south and southwest where it discharges to the Snake River.

The flow of the Boise Valley shallow groundwater system originates essentially along the high recharge area coinciding with the New York Canal. To the east of the New York Canal, the shallow groundwater descends rapidly to the level of the deep groundwater system. West of the canal, shallow groundwater flow is to the west and northwest, corresponding to the gradient of the eroded surface of the Glenns Ferry Formation as well as the direction of deposition of the terrace gravels.

Groundwater Quality

The quality of Boise Valley water resources ranges from generally good to excellent. Surface water from the Eastern Upland is of highest quality, shallow groundwater and agricultural drain waters have the poorest quality, and deep groundwater is of relatively intermediate quality. The intermixing of surface water and shallow and deep groundwater influences their relative qualities.

The quality of the deep groundwater in the study area is indicated in Table 10-1 which contains analyses of samples obtained from 17 deep wells of the Boise Water Corporation. When compared to the quality of the Boise River near Boise, the deep well samples are higher in sodium (15-72 mg/l) and dissolved solids (147 mg/l) content suggesting the impact of recharge from irrigation return flows and wastewater disposal operation. Nitrate concentrations (as NO_3-N) range up to 10 mg/l.

Shallow groundwater in the Boise Valley is almost entirely derived from recharge of Boise River water through irrigation and conveyance networks. The waters immediately beneath irrigated agricultural lands have markedly different quality characteristics than the applied water (see the analysis of the Boise River water near Boise). Dissolved solids increase from a range of 43 to 125 mg/l measured in Boise River below Lucky Peak Dam to a range of 100 to 1,240 mg/l measured in shallow wells. Significant increases occur in all constituents, most notably nitrate (up to 88 mg/l as NO_3-N), sodium (up to 184 mg/l), and chloride (up to 86 mg/l). Continual monitoring of these shallow wells would be a prerequisite to establishing the extent of impacts upon groundwater from irrigation, and to establishing specific mitigation measures.

Agricultural drains exhibit water quality similar to shallow groundwater, especially during the nonirrigation season when no dilution occurs with irrigation return flows, as indicated by the November analysis of Fivemile Creek drain at Star Road (Table 10-1). Whereas the effect of agricultural return flow is to dilute the mineral concentration of drain water during the irrigation season, excess applied irrigation water tends to increase mineral concentrations of shallow groundwater due to increased leaching.

Dion (1972) investigated a possible deterioration of shallow groundwater quality due to land use change since the time of the previous study by Nace, West, and Mower (1957). Increasingly widespread use of septic tank wastewater disposal method was suspected to lead to a rise in nitrate concentrations. However, no significant change in shallow groundwater quality was identified. Sampling also did not reveal high concentrations of fecal coliform bacteria in areas of septic tank use nor a buildup of pesticides from agricultural practices.

Other investigators have continued to evaluate the possible changes in shallow groundwater quality in the Boise Valley, again particularly with emphasis on nitrate concentrations. A study by the Central District Health Department (1979) showed that a

Table 10-1. Chemical Analyses of Deep and Shallow Groundwaters, Boise River Water, and Agricultural Drainage Waters in Boise Valley, Idaho (in mg/l unless otherwise indicated)

Chemical Constituents	Deep Groundwater			Shallow Groundwater							
	Boise Water Corporation [a]			A^b		B^b		U. S. Bureau of Reclamation			
								Sherman Oaks		Westgate	
	Mean	Variance	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range
Spec. Cond. (µmhos/cm)	-	-	-	970	250 -5300	320	20 -950	678	255 - 901	748	100 -1240
Diss. Solids	245	98	147 -500	-	-	-	-	425	315 - 577	418	191 - 616
NH_3-N	-	-	-	0.11	0 - 1.6	0.04	0 - 0.75	0.007	0 - 0.1	0.19	0 - 3.3
NO_2-N	-	-	-	0.03	0 - 0.78	0.003	0 - 0.11	0.007	0 - 0.07	0.01	1 - 0.36
NO_3-N	2.1	3.2	0.08- 10	11.2	0.60- 88	5.5	0.40- 32	3.2	0.04- 6.5	5.8	0.01- 24
Organic N	-	-	-	0.72	0 - 2.5	0.50	0 - 1.8	0.27	0.04- 0.88	0.29	0.02- 2.6
Total P	0.09	0.07	0.02- 0.22	0.41	0.06- 1.7	0.41	0.10- 0.95	0.14	0.02- 1.1	0.71	0.14- 6.0
Ca	31	11	18 - 55	-	-	-	-	59.4	42 - 73	59	28 - 85
Mg	11	8.3	2.0 - 32	-	-	-	-	24	17 - 35	25	13 - 36
Na	34	17	15 - 72	-	-	-	-	61	7 - 117	70	4 - 184
K	-	-	-	-	-	-	-	2.0	1.2 - 2.7	3.6	2.0 - 5.1
Cl	9.7	5.7	2.7 - 25	15	0 - 86	4.0	0 - 15	14	2.1 - 38	27	0 - 63
SO_4	28	22	3.2 - 87	-	-	-	-	59	41 - 73	59	28 - 85
F	0.56	0.16	0.39- 0.75	-	-	-	-	0.97	0.82- 1.1	0.68	0.44- 1.1
S_iO_2	8.0	30	17 - 49	-	-	-	-	50	35 - 58	42	30 - 50
Tot. Hardness	121	60	57 -268	-	-	-	-	-	-	-	-
Tot. Alkalinity	284	95	198 -548	-	-	-	-	-	-	-	-
Total Coliform	-	-	-	-	-	-	-	318	2 -10200	72	2 -1020
Fecal Coliform	-	-	-	-	-	-	-	34	0 - 3000	42	0 -6000
Fecal Strep	-	-	-	-	-	-	-	16	0 - 220	35	0 - 800
HCO_3^h	-	-	-	-	-	-	-	333	273 - 395	175	25 - 331
CO_3^h	-	-	-	-	-	-	-	0	0 - 0	0	0 - 0

Table 10-1. Cont'd.

Chemical Constituents	Shallow Groundwater					Boise River and Agricultural Drains					
	Boise-Nampa Area^d		DWR^e			Boise R. near Boise^f	Boise R. at Star Road^f	Fivemile Creek at Star Road^f	Eagle drain near Eagle^f	Purdam drain near Ada Canyon^g	Mosey Creek near Ada Canyon^g
	Mean	Range	Mean	Variance	Range						
Spec. Cond. (umhos/cm)	596	104-1210	605	199	116 -86	93	326	624	330_	460	540
Diss. Solids	-	-	-	-	-	60	219	448	222	-	-
NH_3-N	-	-	-	-	-	-	-	-	-	0.07	0.08
NO_2-N	-	-	-	-	-	-	-	-	-	0.01	0
NO_3-N	2.7	0- 13	3.1	2.2	0.53-11	]0.13	-	]2.7	-	3.0	3.2
Organic N	-	-	-	-	-	-	-	-	-	0.38	0.36
Total P	0.24	0- 1.8	-	-	-	0.07	-	0.41	-	0.30	0.18
Ca	-	-	-	-	-	12	-	56	-	-	-
Mg	-	-	-	-	-	1.5	-	18	-	-	-
Na	-	-	-	-	-	4.5	-	70	-	-	-
K	-	-	-	-	-	0.8	-	3.5	-	-	-
Cl	16	0- 63	14	9.8	2.4-36	1.5	3.6	14	5.2	8.5	9.4
SO_4	-	-	-	-	-	0	-	62	-	-	-
F	-	-	-	-	-	0.3	-	0.7	-	-	-
SiO_2	-	-	-	-	-	13	-	41	-	-	-
Fecal Coliform	-	-	-	-	-	-	-	50	-	-	-
HCO_3^{h}	-	-	-	-	-	52	-	322	-	-	-
CO_3^{h}	-	-	-	-	-	0	-	11	-	-	-

Footnotes for Table 10-1

[a] Average analyses from 17 wells in study area drawing from deep groundwater system. Range is for mean ananyses of each well. (Boise Water Corporation, 1980).

[b] Area "A" north of I-80 south of Boise River and over Ada Canyon County line. (9 wells). Area "B" along Mason Creek feeder from Hubbard Reservoir Northwest to Ada-Caynon County line. (5 wells). Samples taken monthly 1973-1975 (Lewis et al., 1978)--specially constructed shallow test wells.

[c] Samples taken 7/77 to 9/79 (U. S. Bureau Reclamation, 1979)
Sherman Oaks: 3N1E sec. 23: 5 wells
Westgate: 3N1E sec. 1: 8 wells
--specially constructed shallow test wells.

[d] Samples taken 6, 7, 8/70 from nearly 200 wells in Boise-Nampa area (Ada and Canyon counties) (Dion, 1972)

[e] 21 wells from Idaho Department of Water Resources "Boise Valley Monitoring Newwork" in Ada County study area. Sampled 4/78-9/79 (Leach, 1980).

[f] Boise River and drain. Analyses 11/71 (Thomas and Dion, 1972).

[g] Purdam Drain sampled 1971-1975. Mason Creek sampled 1974-1975. (Lewis et al., 1978).

[h] as $CaCO_3$

74 percent increase in nitrate concentrations had occurred since the time of measurements made by Dion, from an average of 2.02 mg/l NO_3-N in June to August of 1970 to an average of 3.53 mg/l during an undisclosed period in 1979. Preliminary results of the Idaho Department of Water Resources' Boise Valley Monitoring Network (Leach, 1980), however, show this increase to be well within the range of annual fluctuations of nitrate concentrations, commonly fluctuating 3 mg/l and up to 10 mg/l during the year within a given well. Sampling by the U. S. Bureau of Reclamation (1979) indicates annual fluctuations of nitrate concentrations in wells to be commonly over 6 mg/l and as much as 17 mg/l. If the Idaho Department of Water Resources' data of July 1979 is compared to Dion's data of July 1970, little change is observed in any quality parameters (Table 10-1).

Nonpoint Source Waste Loadings of the Groundwater

Summary of Existing Nonpoint Source Discharges to Groundwater in Ada County

Tables 10-2 and 10-3 summarize the estimated nonpoint source loadings for Ada County and the Southwest Study Area, respectively under existing land use conditions. On a county-wide basis irrigated agriculture contributes a significant portion of both salt (88 percent) and nitrogen (75 percent) loadings to local groundwaters. The disposal of wastes from feedlots and dairies in the county represents the second major source of mineral contamination, responsible for the generation of about 11 percent of the salt and 20 percent of the total nitrogen discharged annually. On-site waste disposal practices contribute relatively minor quantities of these constituents, amounting to about 4.5 percent for nitrogen and 1 percent for total salts.

In the Southwest Study Area irrigated agriculture is again the major source of salt and nitrogen loadings to the aquifer. In this case irrigation return flows contribute 84 percent of the salts and 58 percent of the total nitrogen discharged from the three sources investigated in this study. On-site waste disposal is responsible for approximately 11 percent of the salt load and 35 percent of the nitrogen load. The two operating dairies generate the remaining 7 percent of the nitrogen and 5 percent of the total salt emissions.

The figures cited in the summary tables are expressed as total mass emissions of pollutants. As such, the values do not reflect differences that may exist in either the concentration or spatial distribution of discharges. These additional considerations may, however, have a substantial effect upon interpretation of the results. For example, highly concentrated wastes from a dairy or feedlot may severely impact

Table 10-2. Summary of Estimated Nitrogen and Total Salt Loadings to Groundwater from Irrigated Croplands, Animal Husbandry and On-site Waste Disposal in Ada County, 1980

Waste Source	Nitrogen tons/yr	%	Salts tons/yr	%
On-site waste disposal	122	4.5	608	1.1
Animal husbandry	547	20.1	6143	11.0
Irrigated cropland	2058	75.4	49334	87.9
Total	2727	100	56085	100

Table 10-3. Summary of Estimated Nitrogen and Salt Loadings to Groundwater Resulting from Irrigated Agriculture, On-site Waste Disposal and Animal Husbandry in the Southwest Study Area, 1980

Waste Source	Nitrogen tons/yr	%	Salts tons/yr	%
On-site waste disposal	46.4	35.3	233	10.7
Animal husbandry	8.8	6.7	109	5.0
Irrigated cropland	76.4	58.0	1828	84.3
Total	131.6	100	2180	100

the quality of a downstream well, while the emission of a far greater total mass of pollutants from cropland may have no measureable impact because of the low initial strength of these return flows and their large areal dispersion. Interpretation of the data presented in this report should, therefore, be made with an awareness of local factors which may have a significant bearing on the relationships between pollutant discharge and groundwater quality.

Impact of On-Site Wastewater Disposal Systems on Groundwater Resources

The Southwest Boise region is a major area of concentration of septic tank leachfield systems in Ada County. This area is expected to remain unsewered for the foreseeable future under established land use plans. The major impact of septic tanks on groundwater resources of the study area would be manifested by high levels of nitrates and possibly total dissolved salts and pathogenic bacteria and viruses in the shallow groundwater bodies.

The presence of nitrate in groundwater is primarily a result of the leaching of fertilizers from the unsaturated soil and nitrification of organic nitrogen contributed by on-site wastewater disposal systems and other sources. Nitrification is an aerobic process dependent on optimal temperature and pH conditions as well as the availability of sufficient oxygen levels. Low concentrations of ammonia-nitrogen in shallow groundwater measured by the Bureau of Reclamation (1979) (generally less than 1.0 mg/l) indicate that nitrification or denitrification of effluent from septic tanks is occurring primarily in the unsaturated zone. Nitrate production in the Boise Valley is probably limited seasonally by the repeated shifts between aerobic and anaerobic conditions due to the fluctuating near-surface water table and by the cold winter-month soil temperatures. The leaching of nitrate into Boise Valley groundwater most likely occurs as the result of heavy rains, spring snow melt and soil thaw, and the application of excess irrigation water. Groundwater recharge from the infiltration of excess irrigation water not only results in the leaching of nitrate but may also significantly dilute nitrate concentrations. Thus, seasonal peaks in groundwater nitrate concentration can be justified theoretically at several times throughout the year depending on a variety of complex environmental conditions.

Mink, et al. (1975) found high levels of ammonia and coliform bacteria in the immediate vicinity of septic tank leachfields constructed in areas with exceptionally high water tables at several study sites in the Boise Valley. The low values of nitrate and nitrite concentrations were believed to be due to the inhibition of the nitrification process by high water table conditions.

Nitrogen emissions in the Boise Valley are most likely increasing as a result of septic tank wastewater disposal practices. However, annual recharge of conveyance losses and excess applied irrigation water has the effect of diluting mineral concentrations to near-normal levels, particularly during the summer and early fall months. Widespread dilution by rather uniformly distributed excess applied irrigation water perhaps explains the lack of well-defined high nitrate zones in the study area. Nitrate levels may remain unchanged until the present practice of applying an average of 3.00 acre-feet per acre per year of excess-irrigation water of low nitrate concentration is significantly altered. It is also probable that there exists a trend of increasing peak-annual nitrate concentrations in groundwater during the non-irrigation season which has gone undetected due to infrequent sampling. An ongoing sampling program undertaken by the Idaho Department of Water Resources will provide the much-needed data in future years.

Groundwater Conditions and Land Use Change

Some of the previous investigations on groundwater conditions in the Boise Valley were aimed at evaluating the impact of land use changes on groundwater level and quality characteristics. Land disposal of domestic and other wastewaters has offset some of the losses in the historical sources of recharge. The decline of irrigated acreage due to suburbanization may have diminished the rate of recharge to the shallow-groundwater body and caused a lowering in the water table. Increasingly widespread use of septic tanks as well as long-term effects of agriculture have been expected to result in groundwater quality degradation.

No significant changes in groundwater quantity and quality conditions were observed in the Boise-Nampa area between 1953 and 1970. The explanation given for a lack of change in shallow groundwater levels were as follows: (1) the magnitude of change in recharge and discharge were relatively small, (2) seasonal and year-to-year fluctuations in water-supply conditions overshadowed any progressive changes in groundwater conditions with time, and (3) small changes in the level of near-surface water tables were moderated by the influence of artificial drains.

Results of the present study tend to indicate the existence of a correlation between the quality of shallow groundwater body and the volume of recharge from irrigation water distribution network and cropped land areas. It appears that recharge from these sources helps to dilute the waste loadings derived from agricultural, residential and commercial land use practices. As additional agricultural lands are converted to nonagricultural uses, the balance between nitrogen and salts loadings and the volume of water recharged to the aquifers will be adversely affected.

Even after suburbanization changes, significant volumes of Boise River irrigation water are being recharged to the groundwater by irrigation of landscaped areas. On the other hand, the continued trend of lining the irrigation canals and laterals will significantly reduce shallow groundwater recharge. Reduced shallow groundwater recharge will undoubtedly result in lower water tables and a shift in the shallow groundwater divide, possibly to the west away from the New York Canal. Lowering of the water table will place groundwater of relatively poorer quality nearer to the zone in which the main water supply wells are located. Additional long-term monitoring of groundwater levels and quality conditions must be carried out to provide adequate data for evaluating the impact of land use changes in the study area.

Mitigation Measures

Under land use Plan C, Rural Life Style, it is expected that the Southwest Boise area will retain its rural characteristics for the foreseeable future. Although some population growth is expected to occur in this area over the next 20 years, it is improbable that the anticipated growth will create a major change in groundwater quality and quantity conditions, barring any significant unforeseen changes in other land use practices or in the irrigation practices of local farmers.

Based on the above discussion, no specific mitigation measure is deemed necessary to alleviate the adverse impact of septic tank discharge on groundwater quality in the study area. Regular monitoring of shallow and deep groundwater quality, preferably on a seasonal basis, should, however, be carried out by an appropriate government agency to provide needed data for future planning and decision-making purposes. Also, adequate controls should be maintained on siting, design, installation and maintenance of septic tank and leachfield systems to assure the protection of public health and safety. The adopted operation and maintenance program and related measures are described in Chapter 3.

Impacts of Sludge Disposal on Groundwater Resources

Boise Sludge Disposal Site

Land at the Idaho State Penitentiary is considered to be the preferred site for sludge disposal. Soils mapping of the site was conducted by the SCS and soil suitability ratings for sludge application were identified.

The surveys showed that much of the area was underlain by a hardpan layer, ranging from 13-34 inches below the surface. The water table is located below the hardpan layer, at an unknown depth. The SCS survey indicated a depth to groundwater of 72 inches, while other SCS data indicated depths to the seasonal high water table ranging from 24-60 inches (CH2M Hill 1980c). An irrigation well on the site is known to draw water from a depth of 550 feet.

The presence of the hardpan layer between the surface and the groundwater should prevent the movement of leachate downward. Because it is unlikely that the hardpan layer occurs uniformly throughout the area, leachate could travel downward toward the water table wherever cracks or breaks in the hardpan occur.

During the rainy season water may perch above the hardpan and move laterally downslope. Much of the sludge application site is flat or has slopes of 3 percent or less.

The migration of heavy metal ions into the groundwater should not occur so long as the soil and sludge pH is maintained above 6.5 (U. S. EPA 1977a).

Surface ponding of liquid sludge may increase mosquito populations. Pathogens from the sludge may be transmitted by insect or rodent vectors or by aerosols. Sludge has the potential to cause odors in the area of application.

Sludge has the potential benefit of fertilizing crop lands with a product otherwise buried in landfill or unavailable. This also has potential benefits of possible revenue to the City of Boise through sale of sludge, and of reduced costs to the farmer.

Mitigation Measures

The IDHW has prepared Guidelines for Land Application of Municipal Sewage Sludge which include a number of features designed to protect groundwater resources:

> Site approval requires demonstration that the proposed project will not result in violation of water quality standards applicable to ground and surface water (Idaho Department of Environmental and Community Services, 1973). Factors that will be considered in granting approval include:
>
> - Proximity to water supply wells.
> - Existing quality and use of groundwater.
> - Geohydrological characteristics of the site; the minimum groundwater depth should not be less than 4 feet.

Monitoring wells should be installed as indicated by a geohydrological study of the site. The wells and surface streams in the areas should be analyzed for nitrogen, heavy metals, organic and fecal coliforms before sludge disposal at the site and during the life of the project.

Mosquito population may be limited by reducing surface ponding and by using mosquito control measures as necessary.

Pathogens in the sludge are not expected to be significant, however opportunities for exposure to humans should be reduced by limiting access such as by fencing and by "buffer zones". The site is already on prison land and public access reduced accordingly.

Spraying should be avoided on windy days in order to eliminate drift of liquid or aerosols from the application area.

Odors may be mitigated by "buffer zones" between the treated area and human use areas. Additional measures such as working the sludge into the soil may be required as necessary.

Eagle Sewer District Disposal Site

Analysis of potential impacts of the ESD rapid infiltration project will require additional soils testing and a study of vertical and lateral groundwater movements. The lack of industrial discharges to the ESD system and the probable requirement for underdrains at the infiltration site suggest that there should be few significant impacts.

Chapter 11

THE BOISE RIVER ECOSYSTEM

Introduction

The Boise River has many roles in Ada County. Once a prolific producer of anadromous fish, the river's principal functions are now irrigation water supply, recreational boating and floating, freshwater fisheries, drainage, and reception and transport of treated sewage effluent from urban areas in the Boise Valley. This chapter focuses on the effects of the new and enlarged Boise and Eagle wastewater treatment and disposal facilities on the hydrology, water quality, and fisheries of the Boise River.

Summary of Impacts

The proposed wastewater facilities will cause or contribute to the following impacts:

- 23 percent of the total nitrogen load in the river
- 47 percent of the total phosphorus load in the river
- possible algal growth increases downstream
- higher peak flows and nonpoint pollutant loads from urbanized areas
- short-term increases in sediment load from facilities construction activities
- long-term degradation of fishery habitat

Boise and Eagle wastewater facilities will contribute about 23 percent of the total nitrogen load and about 47 percent of the total phosphorus load to the Boise River in the year 2000. Nutrient removal may be a future option to decrease excessive algal growth levels in Snake River reservoirs.

Urban growth using the expanded sewage facilities will contribute to increased runoff rates including higher peak flows during storms and increased nonpoint source pollutant loads in the Boise River. These changes are expected to lower the quality of habitat for trout and whitefish in the Boise River. Implementation of a master drainage and nonpoint source pollution reduction program could reduce these impacts.

The construction of the sewage treatment and outfall facilities may have temporary construction impacts on water quality and fisheries. Special care needs to be taken to protect and preserve riparian habitat in construction areas.

Existing Conditions

Hydrology

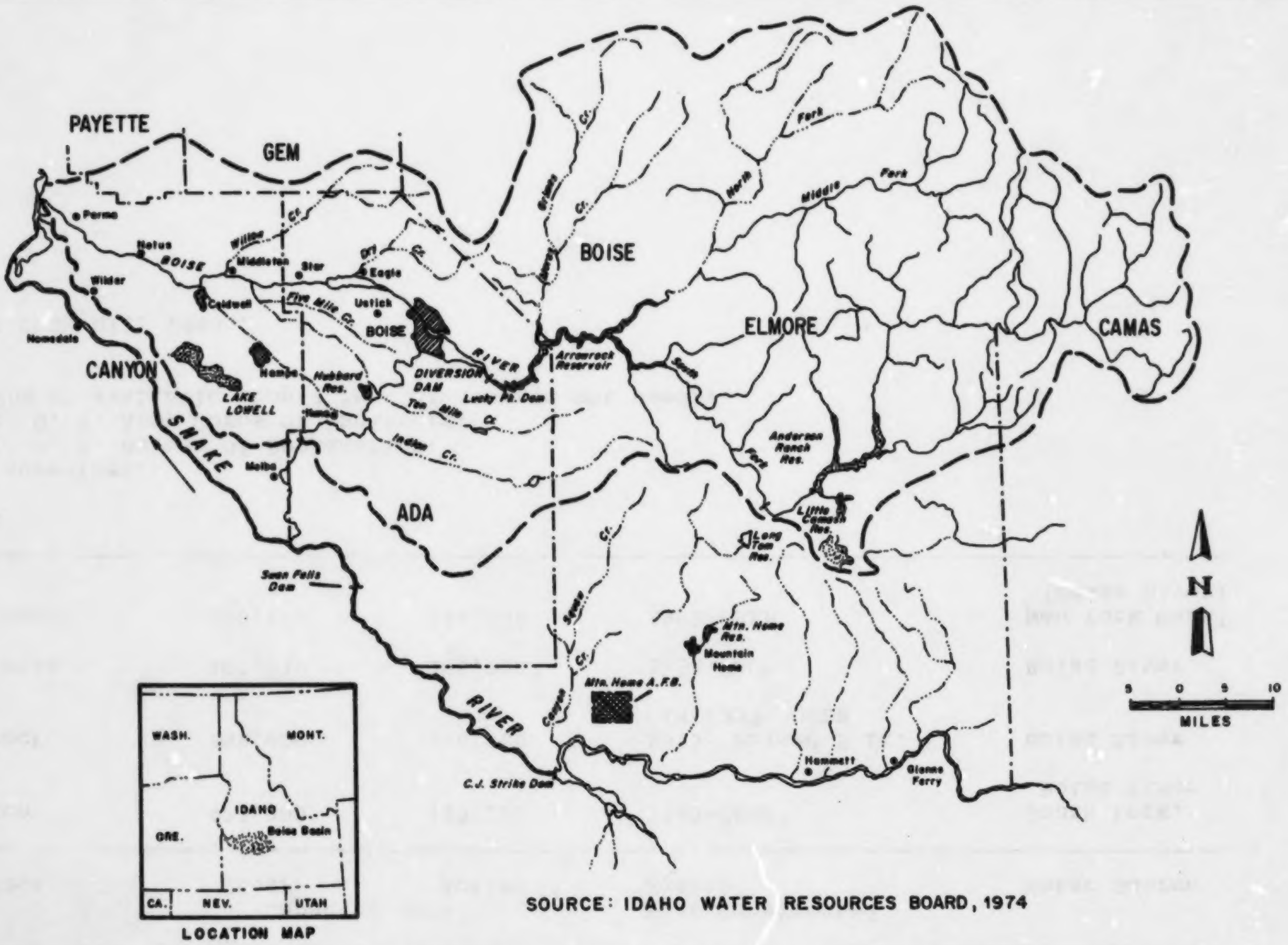
The Boise River flows westerly for about 200 miles from its headwaters in the Sawtooth Mountains to its confluence with the Snake River, draining a watershed area of 4,234 square miles (Figure 11-1).

Peak flows in the Boise River occur during the spring snowmelt period between April and June, although high flows of short duration also occur due to summer thundershowers. Minimum flows occur during winter months. During the winter when there is no demand for irrigation water, runoff is generally stored in reservoirs.

River Regulation. Boise River flow is regulated by three on-stream reservoirs (Lucky Peak, Arrowrock, and Anderson Ranch) and one off-stream reservoir (Lake Lowell). Various direct diversions along the Boise River also regulate the flow. The four reservoirs and their storage characteristics are shown in Table 11-1.

Lucky Peak was the most recent dam to be constructed. It is operated in conjunction with Arrowrock and Anderson Ranch to maximize irrigation, flood control, power production and recreation benefits. Storage capacity in Lucky Peak has been allocated (Table 11-2) to irrigation and to the Idaho Department of Fish and Game for minimum stream flow maintenance during the nonirrigation season. Unallocated storage in Lucky Peak (Table 11-2) was set aside for future irrigation needs. Demand for this capacity from newly irrigated lands, however, has not occurred. Irrigation districts have the right to purchase some of the capacity on a year-to-year basis if their supply falls short.

A cooperative study of the effects of reservoir operations on the Boise River system is currently being conducted by the Idaho Department of Water Resources, the U. S. Army Corps of Engineers, and the U. S. Bureau of Reclamation (USBR). A second study, which will assess the possible fate of the unallocated capacity in Lucky Peak Reservoir, is being conducted by USBR (CH2M Hill 1980b). The results of these studies may have significant bearing on the amount of Boise River flow available to dilute Boise sewage effluent. The USBR study is not expected to be complete until 1982.


PAYETTE
GEM
BOISE
ELMORE
CAMAS
CANYON
ADA
Parma
Notus
BOISE
Wilder
Homedale
Willow Cr.
Middleton
Star
Dry Cr.
Eagle
Caldwell
Five Mile Cr.
Ustick
BOISE
Nampa
Hubbard Res.
Kuna
LAKE LOWELL
DIVERSION DAM
RIVER
Arrowrock Reservoir
Lucky Pk. Dam
Ten Mile Cr.
Indian Cr.
SNAKE
Melba
Swan Falls Dam
RIVER
C.J. Strike Dam
Canyon Cr.
Mtn. Home A.F.B.
Mtn. Home Res.
Mountain Home
Long Tom Res.
Little Camas Res.
Anderson Ranch Res.
Fork
South
North Fork
Middle Fork
Cr.
Hammett
Glenns Ferry
N
0 5 10
MILES
WASH.
MONT.
IDAHO
ORE.
Boise Basin
CA.
NEV.
UTAH
LOCATION MAP

SOURCE: IDAHO WATER RESOURCES BOARD, 1974

FIGURE 11-1. BOISE RIVER WATERSHED

Table 11-1. Principal Reservoirs in the Boise River Basin

Reservoir	Capacity (AF)[1] Gross	Active	Year Constructed Agency	Water Source
Anderson	493,200	423,200	1945-USBR[2]	South Fork, Boise River
Arrowrock	286,600	286,600	1915; raised 5 ft. in 1937- USBR	Boise River
Lucky Peak	307,040	266,200[4]	1954-USCE	Boise River
Lake Lowell	190,100	169,000	1908-USBR	New York Canal (Boise River)

NOTES:

[1] AF: acre-feet.
[2] USBR: U. S. Bureau of Reclamation.
[3] USCE: U. S. Army Corps of Engineers.
[4] 278,200 AF available (top 4 feet of storage not used).

SOURCE CH2M Hill 1980b.

Table 11-2. Lucky Peak Reservoir Storage Allocation

Use	Total Capacity (AF)	Usable Capacity (AF)
Irrigation	111,750	107,200
Idaho Department of Fish and Game	50,000	47,800
Unallocated	116,250	111,200
TOTAL	278,000	266,200

SOURCE: CH2M Hill 1980b.

Flooding. Flooding has historically occurred on the Boise River during spring runoff and thunderstorms. The frequency of flooding, however, has decreased as the degree of river regulation has increased. The highest recorded flood flow occurred in 1896 when 35,500 cubic feet per second (cfs) was measured at Boise. The largest rainfall-related flood was recorded in 1909 at 15,200 cfs.

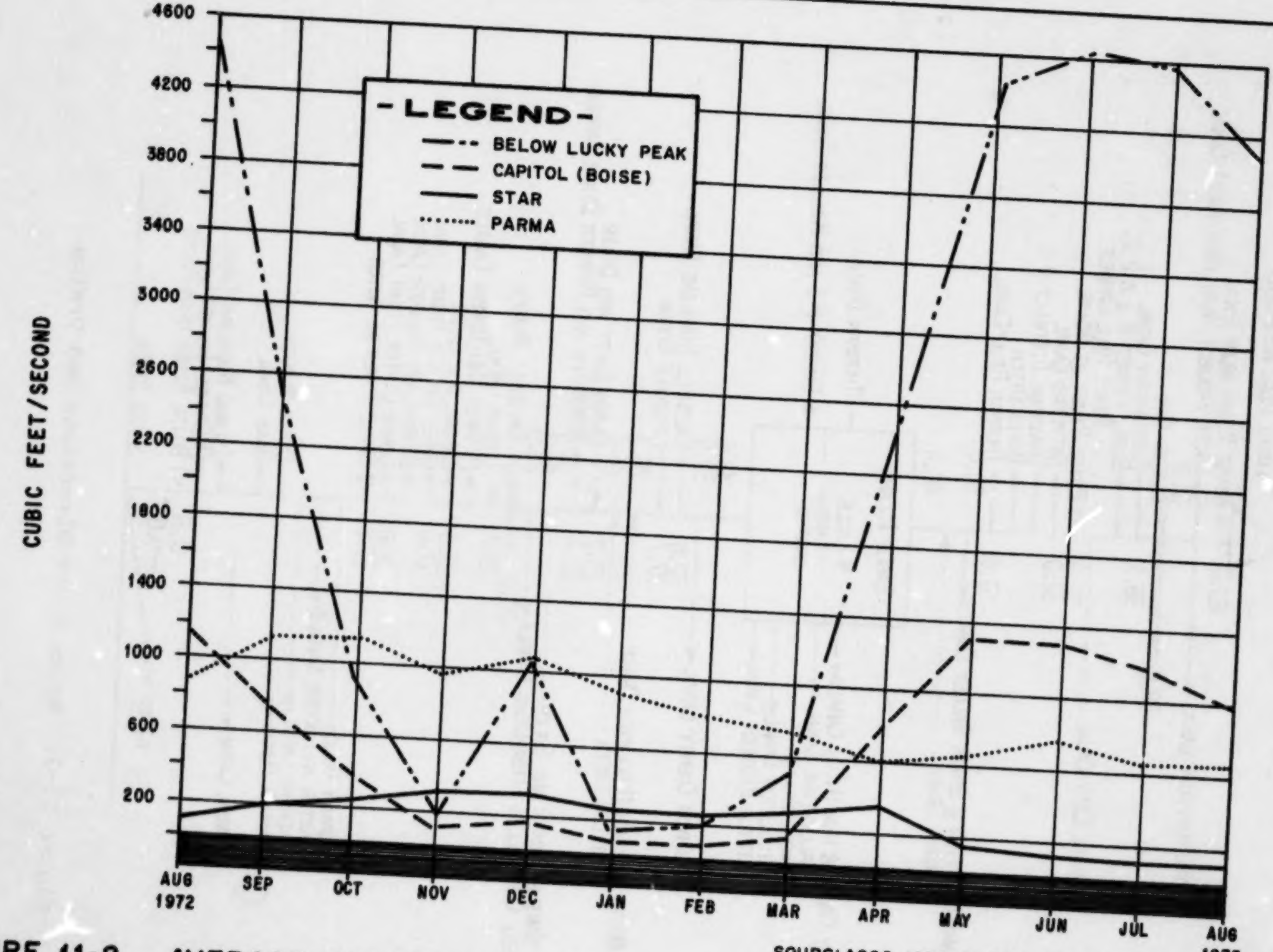
The Boise River is currently regulated so as not to exceed a flow of 6,500 cfs in Boise. Flooding occurs within the Boise Metropolitan area at flows exceeding channel capacity of 6,500 cfs. Major flooding generally occurs at flows over 10,000 cfs.

Flood control operations at the reservoirs begin in January and usually continue through May, when storage begins to fill the empty flood control capacity.

Irrigation. The greatest use of surface water in the Boise River watershed is for irrigation. Irrigation in the Boise Valley dates from the late 1800s. Currently, there are 31 major irrigation diversions from the Boise River. These canals have a total capacity of 6,700 cfs (Idaho Water Resources Board [IWRB] 1974). A transbasin diversion from the South Fork of the Boise River occurs at Little Camas Reservoir. This diversion, averaging 10,500 acre-feet per year, is used for irrigation of lands in the Mountain Home Irrigation District, outside of the Boise River watershed.

Flow Conditions. The flows of the Boise River vary significantly between Lucky Peak Dam and the mouth of the river. Hydrographs representing the flow in the Boise River at various locations are shown in Figure 11-2. During the irrigation season significant flow reductions occur between Lucky Peak Dam and Capitol Street Bridge. Between Capitol Street and Star, the flow is reduced even more due to additional diversions. At Parma, agricultural return flows add to the river and increase the flow. Figure 11-3 is a schematic of the major diversions and drains.

Calculated natural annual flow (with no dams or diversions) and impaired flow (with existing dams and diversions) below Lucky Peak Reservoir, and 1-in-2 year and 1-in-10 year flows at Boise are shown in Figure 11-4. As a result of regulation and diversion, flows are much lower than natural, especially during the nonirrigation season (November-March). The 1-in-10 year low flow at Boise during the nonirrigation season is lower than the 1-in-2 year flow by about a factor of 10, while the difference during the irrigation season is much less. The greater difference during the nonirrigation season is partially due to periodic maintenance shutdowns of the Lucky Peak outlet structure.



SOURC: ACOG 1975 & IDWR DATA

FIGURE 11-2. AVERAGE MONTHLY FLOW AT FOUR LOCATIONS ON BOISE RIVER-(AUGUST 1972 THROUGH JULY 1973)

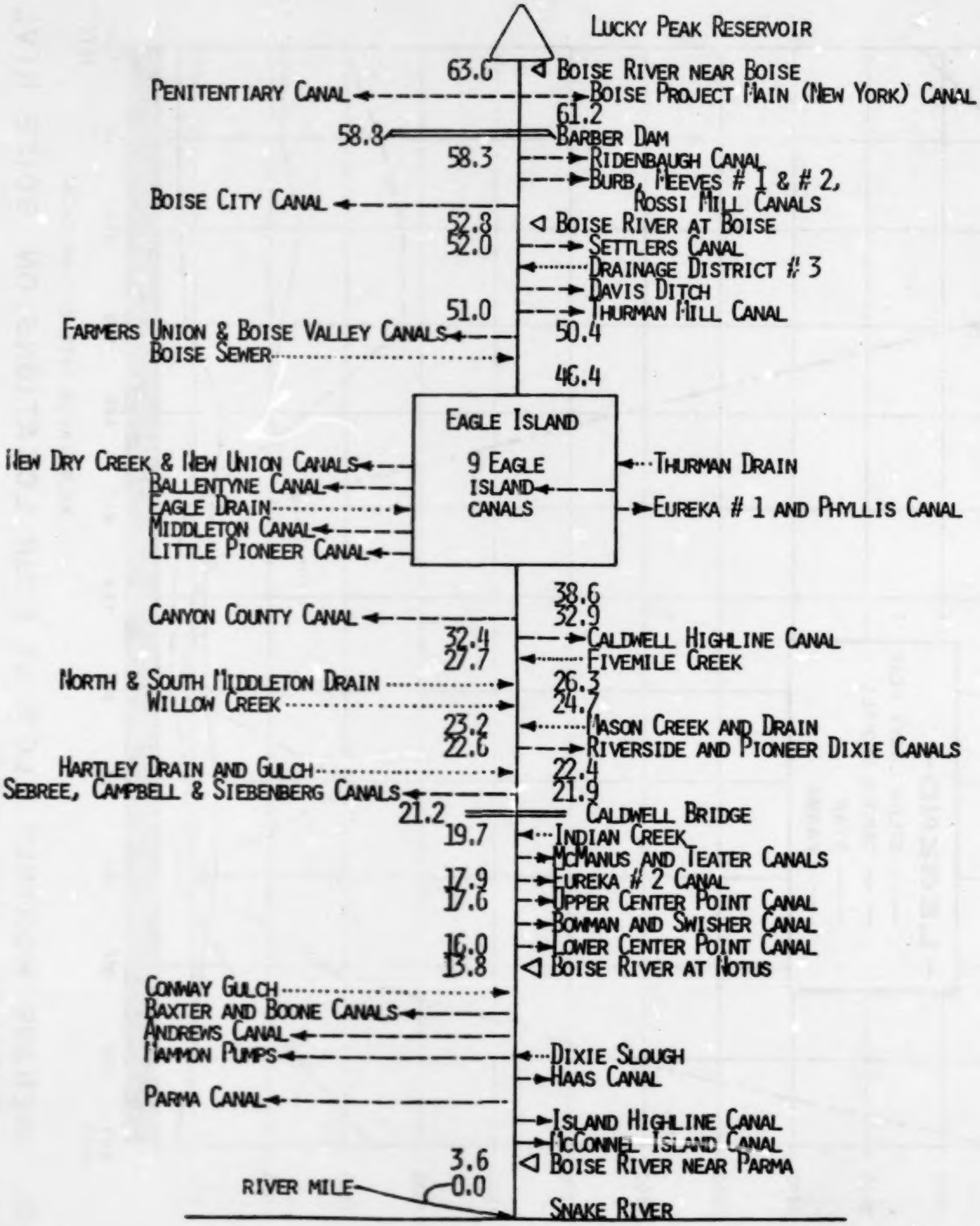
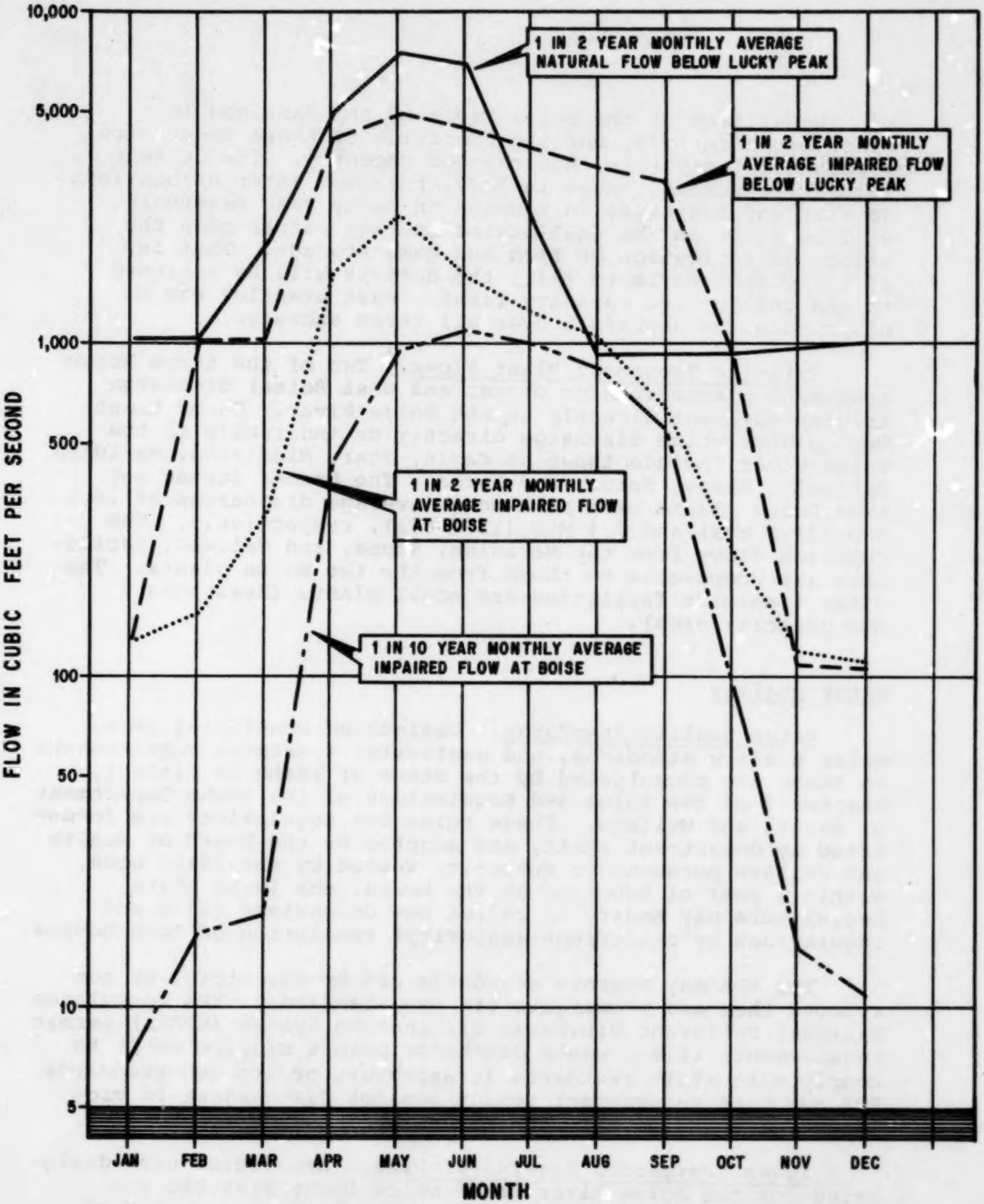

LUCKY PEAK RESERVOIR
63.6
BOISE RIVER NEAR BOISE
PENITENTIARY CANAL
BOISE PROJECT MAIN (NEW YORK) CANAL
61.2
58.8
BARBER DAM
58.3
RIDENBAUGH CANAL
BURB, REEVES # 1 & # 2, ROSSI MILL CANALS
BOISE CITY CANAL
52.8
BOISE RIVER AT BOISE
52.0
SETTLERS CANAL
DRAINAGE DISTRICT # 3
DAVIS DITCH
51.0
THURMAN MILL CANAL
FARMERS UNION & BOISE VALLEY CANALS
50.4
BOISE SEWER
46.4
EAGLE ISLAND
9 EAGLE ISLAND CANALS
NEW DRY CREEK & NEW UNION CANALS
THURMAN DRAIN
BALLENTYNE CANAL
EAGLE DRAIN
EUREKA # 1 AND PHYLLIS CANAL
MIDDLETON CANAL
LITTLE PIONEER CANAL
38.6
CANYON COUNTY CANAL
32.9
32.4
CALDWELL HIGHLINE CANAL
27.7
FIVEMILE CREEK
NORTH & SOUTH MIDDLETON DRAIN
26.3
WILLOW CREEK
24.7
23.2
MASON CREEK AND DRAIN
22.6
RIVERSIDE AND PIONEER DIXIE CANALS
HARTLEY DRAIN AND GULCH
22.4
SEBREE, CAMPBELL & SIEBENBERG CANALS
21.9
21.2
CALDWELL BRIDGE
19.7
INDIAN CREEK
MCMANUS AND TEATER CANALS
17.9
EUREKA # 2 CANAL
17.6
UPPER CENTER POINT CANAL
BOWMAN AND SWISHER CANAL
16.0
LOWER CENTER POINT CANAL
13.8
BOISE RIVER AT NOTUS
CONWAY GULCH
BAXTER AND BOONE CANALS
ANDREWS CANAL
HAMMON PUMPS
DIXIE SLOUGH
HAAS CANAL
PARMA CANAL
ISLAND HIGHLINE CANAL
MCCONNEL ISLAND CANAL
3.6
BOISE RIVER NEAR PARMA
RIVER MILE
0.0
SNAKE RIVER

Figure 11-3. Boise River Diversions and Drains.

SOURCE: USBR 1977.



(USGS DATA, U.S. ARMY CORPS OF ENGINEERS DATA) YEARS OF RECORD 1955-1979

FIGURE 11-4. HYDROLOGIC CHARACTERISTICS OF THE BOISE RIVER BELOW LUCKY PEAK DAM AND AT BOISE

Regulation of the Boise River by the dams now in place began in 1955, but the operation of those reservoirs, especially Lucky Peak, has changed recently. The current regulation scheme, begun in 1977, balances water allocations so that any shortages in storage in Lucky Peak Reservoir will be taken in the unallocated storage rather than the allocated irrigation or fish and game storage. That is, if Lucky Peak fails to fill, the deficit will be assigned to the unallocated capacity first. Past practice was to distribute the shortfall over all three storages.

Existing Treatment Plant Flows. Two of the three Boise treatment plants (Lander Street and West Boise) discharge treated effluent directly to the Boise River. Other treatment plants which discharge directly or indirectly to the Boise River include those at Eagle, Star, Middleton, Meridian, Caldwell, Nampa, Notus, and Parma. The Lander Street and West Boise plants have peak month average discharges of 14.6 MGD (22.6 cfs) and 7.4 MGD (11.4 cfs), respectively. The combined flows from the Meridian, Nampa, and Caldwell facilities are comparable to those from the two Boise plants. The other treatment facilities are small plants (less than 1 MGD capacity each).

Water Quality

Water Quality Standards. Designated beneficial uses, water quality standards, and wastewater treatment requirements in Idaho are promulgated by the State of Idaho in Title 1, Chapter 2 of the Rules and Regulations of the Idaho Department of Health and Welfare. These rules and regulations are formulated by department staff, and adopted by the Board of Health and Welfare pursuant to authority vested by the Idaho code. Within 1 year of adoption by the board, the Idaho State Legislature may modify or reject new or revised rules and regulations by concurrent (majority) resolution of both houses.

The EPA may approve standards set by the state, or not approve them and promulgate its own standards. EPA formulates National Pollutant Discharge Elimination System (NPDES) permit requirements (i.e., waste discharge permit requirements) to comply with state standards it approves, or its own standards. EPA may take enforcement action against dischargers in violation of NPDES permit requirements.

Idaho Designated Beneficial Uses. Beneficial uses designated for the Boise River basin below Lucky Peak Dam are shown in Table 11-3. Above river mile 50 (the location of the Lander Street sewage treatment plant discharge) the river is protected for all uses, and is designated a "Special Resource Water". Below river mile 50, domestic water supply and Special Resource Water designations are dropped.

Table 11-3. Protected Beneficial Uses of Waters of the Boise River Basin Below Lucky Peak Dam

River Reach	Beneficial Uses							
	Domestic Water Supply	Agricultural Water Supply	Cold Water Biota	Warm Water Biota	Salmonid Spawning	Primary Contact Recreation	Secondary Contact Recreation	Special Resource Water
Boise River - Lucky Peak to River Mile 50 (through Veterans State Park)	●	●	●		●[1]	●	●	●
Boise River - River Mile 50 (Veterans State Park) to Caldwell		●	●		*	●	●	
Ten Mile Creek		●	*		*		●	
Five Mile Creek		●	*		*		●	
Boise River - Caldwell to mouth		●	*		*	●	●	
Indian Creek - Above Sugar Avenue, Nampa		●	●		●	●	●	
Indian Creek - Below Sugar Avenue, Nampa		●	*			*	●	

● Protected for present use.
* Protected for future use.
[1] Except Lucky Peak Dam to Diversion Dam.
SOURCE: Title 1, Chapter 2, Rules and Regulations of the Idaho Department of Health and Welfare.

The rules and regulations state that protected uses are not limited to those listed; and that "in all cases, existing beneficial uses of the waters of the state shall be protected" (Section 1-2050.026).

Idaho Standards for Protection of Beneficial Uses. The water quality standards for protection of beneficial uses are shown in Table 11-4. The standards for a given use apply to waters protected for that use, unless superseded elsewhere in the regulations. For example, the dissolved oxygen standard for salmonid spawning in the Boise River below river mile 50 (the Lander Street discharge) is lowered to 6 mg/l or 75 percent of saturation, whichever is greater, by Section 1-2278 of the regulations.

In late March 1980, the Idaho legislature revised the un-ionized ammonia standard for Indian Creek below Nampa to 1.0 mg/l. The legislature has also lowered the dissolved oxygen standards below reservoirs from 6 mg/l to 5 mg/l.

Existing Water Quality Conditions. The water quality conditions of the Boise River and its tributaries have been extensively studied since the early 1970s. Sampling has included dissolved and suspended constituents, bacteria and the biotic communities. Sampling agencies have included:

- Ada Planning Association
- U. S. Bureau of Reclamation
- City of Boise
- Boise State University
- Idaho Department of Health and Welfare
- U. S. Army Corps of Engineers
- Idaho Department of Fish and Game
- U. S. Environmental Protection Agency
- U. S. Fish and Wildlife Service

Water quality conditions are governed by various point source discharges, by agricultural return flows and by river flow available to dilute pollutant loads. During the winter nonirrigation season, flow in the river below Lucky Peak is often insufficient to provide adequate dilution of wastes discharged to the river. In the irrigation season, diversion of flow for agricultural usage may create low flow conditions in the vicinity of Star. Below Star flows again increase due to agricultural return flows.

Existing water quality conditions for the Boise River are summarized in Table 11-5. Generally, the water quality of the Boise River worsens downstream of Boise. This degradation is due to the various point and nonpoint source pollutant loads entering the river. Several industrial discharges, in addition to the municipal waste load, add significant pollutant loads. Agricultural drains also account for a portion of the total pollutant load in the river. Detailed conditions are given below.

Table 11-4. Summary of Idaho State Water Quality Standards For Designated Beneficial Uses

Use	Parameter	Standard
Primary Contact Recreation	Fecal coliform (May 1-Sept. 30)	≤500/100 ml any sample ≤50/100 ml 30-day geometric mean
Secondary Contact Recreation	Fecal coliform	≤800/100 ml any sample ≤200/100 30-day geometric mean
Cold Water Biota	Dissolved oxygen	> 6 mg/l at all times
	pH	6.5-9.0
	Temperature	< 22°C instantaneous; < 19°C daily average
	Total Dissolved Gases	<110 percent of saturation
	Un-ionized NH_3	<0.04 mg/l 30-day mean if water quality characteristics near optimal, <0.02 mg/l otherwise
Salmonid Spawning (During Spawning and Incubation)	Dissolved oxygen	>6 mg/l or 90 percent saturation, whichever greater
	pH	6.5-9.0
	Temperature	< 13°C instantaneous; < 9°C daily average
	Total Dissolved Gases	<110 percent of saturation
	Un-ionized NH_3	<0.04 mg/l 30-day mean if water quality characteristics near optimal; <0.02 mg/l otherwise
Domestic Water Supply	Arsenic	< 0.05 mg/l
	Barium	< 1 mg/l
	Cadmium	< 0.01 mg/l
	Chromium	< 0.05 mg/l
	Cyanide	< 0.2 mg/l
	Fluoride	< 2.4 mg/l (< 12°C) < 2.2 mg/l (12.1-14.6°C) < 2.0 mg/l (14.7-17.6°C) < 1.8 mg/l (17.7-21.4°C) < 1.6 mg/l (21.5-26.1°C) < 1.4 mg/l (26.3-32.5°C)
	Lead	< 0.05 mg/l
	Mercury	< 0.002 mg/l
	Nitrate	< 10.0 mg/l as N
	Selenium	< 0.01 mg/l
	Silver	< 0.05 mg/l
	Endrin	< 0.0002 mg/l
	Lindane	< 0.004 mg/l
	Methoxychlor	< 0.1 mg/l
	Toxaphene	< 0.005 mg/l
	2,4 D	< 0.1 mg/l
	2,4,5, TP with Silvex	< 0.01 mg/l

NOTES:

For more detailed information concerning standards and sampling requirements, consult the rules and regulations.

SOURCE: Section 1-2250, Rules and Regulations of the Idaho Department of Health and Welfare.

Table 11-5. Average Water Quality Conditions of the Boise River Main Stem

	Boise River Below Lucky Peak		Boise River Below Barber Dam		Boise River At Glenwood Bridge		Boise River At Star		Boise River at Highway 30 Bridge, Caldwell	
	S*	W*	S	W	S	W	S	W	S	W
pH (units)	7.3	7.3	7.2	7.3	7.4	7.5	7.4	7.5	7.7	7.8
Temperature (°C)	11.9	7.3	12.0	7.2	12.7	7.3	14.3	7.3	14.9	7.5
DO (mg/l)	10.1	11.6	9.6	11.8	9.4	11.2	9.5	11.1	8.7	11.4
BOD (mg/l)	1.1	1.2	1.2	1.1	1.4	2.7	1.9	2.5	1.8	2.2
Ammonia -N (mg/l)	.02	.02	.02	.02	.20	.43	.04	.20	.03	.10
Nitrite -N (mg/l)	< .01	.01	< .01	< .01	.02	.03	.02	.03	.02	.05
Nitrate -N (mg/l)	.12	.23	.12	.16	.19	.32	.37	1.07	.86	1.60
Organic Nitrogen -N (mg/l)	.28	.26	.28	.25	.29	.36	.38	.41	.50	.43
Total Phosphorus -P (mg/l)	.04	.06	.04	.05	.19	.31	.17	.39	.26	.33
Ortho Phosphorus -P (mg/l)	.01	.03	.01	.02	.14	.23	.12	.30	.15	.22

*S = summer, April-September
W = winter, October-March

SOURCE: STORET (data collected by U. S. Water and Power Resources Service, mainly from 1977-1979).

Temperature. The temperature of the Boise River increases in downstream direction and is especially elevated during the summer months. An increase in water temperature occurs between Caldwell and Parma stations, which have average summer temperatures of 14.9°C and 17.4°C, respectively. The flows in this reach are governed by agricultural return flows.

Dissolved Oxygen. Adequate levels of dissolved oxygen are necessary for the survival of fish and other aquatic organisms. STORET (EPA computerized data base) data show that dissolved oxygen concentrations in the Boise River decrease in a downstream direction during the summer months. During the winter the average dissolved oxygen is relatively stable, with only a slight decrease downstream. The agricultural drains usually have lower dissolved oxygen concentrations than the Boise River.

Ada Council of Governments (ACOG 1975d) found dissolved oxygen concentrations to decrease in a downstream direction. The concentrations, however, were determined to be within acceptable limits for the beneficial uses along the river.

At Star, EPA (1971a) found minimum percentage dissolved oxygen saturation. Star is the point in the river where flows are greatly reduced, often approaching a no-flow condition.

Nutrients. The major nutrients used by algae and other aquatic plants include various nitrogen and phosphorus compounds. Nitrogen released in sewage effluent is primarily in the form of organic nitrogen or ammonia. Various bacteria decompose the organic nitrogen to ammonia, while other bacteria convert ammonia to nitrite and nitrate. Algae can use ammonia, nitrite, or nitrate; the nitrate form, however, is most readily used. While ammonia and nitrite can serve as plant nutrients, these two forms of nitrogen can also be toxic to fish.

Very little ammonia is found in the river above Boise. Ammonia concentrations reach a maximum (0.43 mg/l in winter) at Glenwood Bridge. The increase is due to wasteloads, especially treated municipal sewage, entering at Boise. Below Boise, the river shows improvement with the ammonia concentrations decreasing (EPA 1971a, ACOG 1975d). Nitrate increases in a downstream direction, with the highest concentrations found at Parma (Figure 11-5). The large nitrate concentration at Parma is due not only to upstream discharges of ammonia, organic nitrogen and nitrite from wastewater effluent, but also due to runoff from agricultural lands.

Total phosphate and orthophosphate increase in a downstream direction. Orthophosphate averages 0.01 mg/l below Lucky Peak and 0.30 mg/l at Star. The increase is primarily in response to runoff from agricultural acreage or accretions from groundwater recharge from irrigation and treated sewage effluent. Figure 11-6 shows total phosphorus conditions in the Boise River.

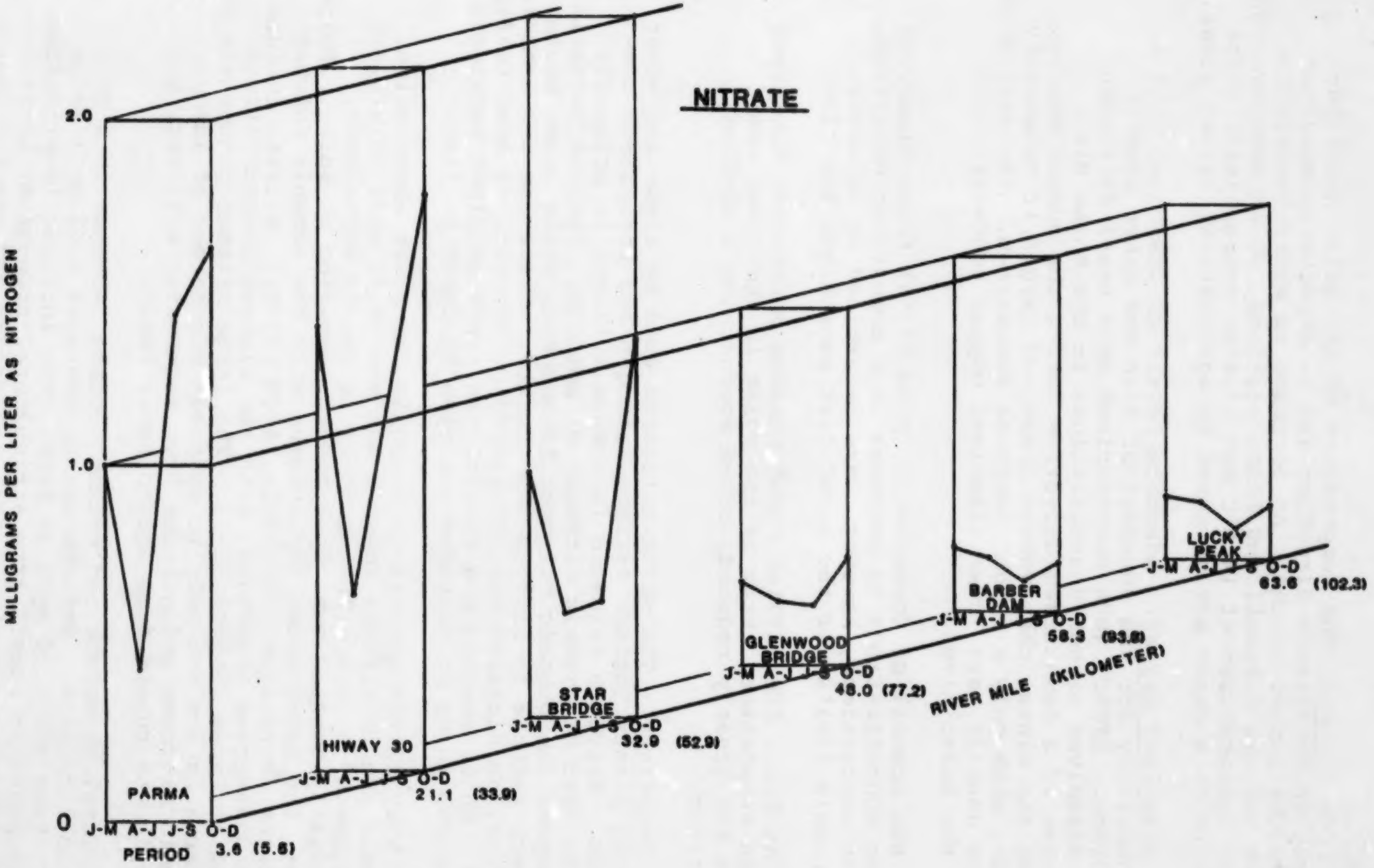


Figure 11-5. Nitrate conditions in Boise River.

SOURCE: USBR 1977.

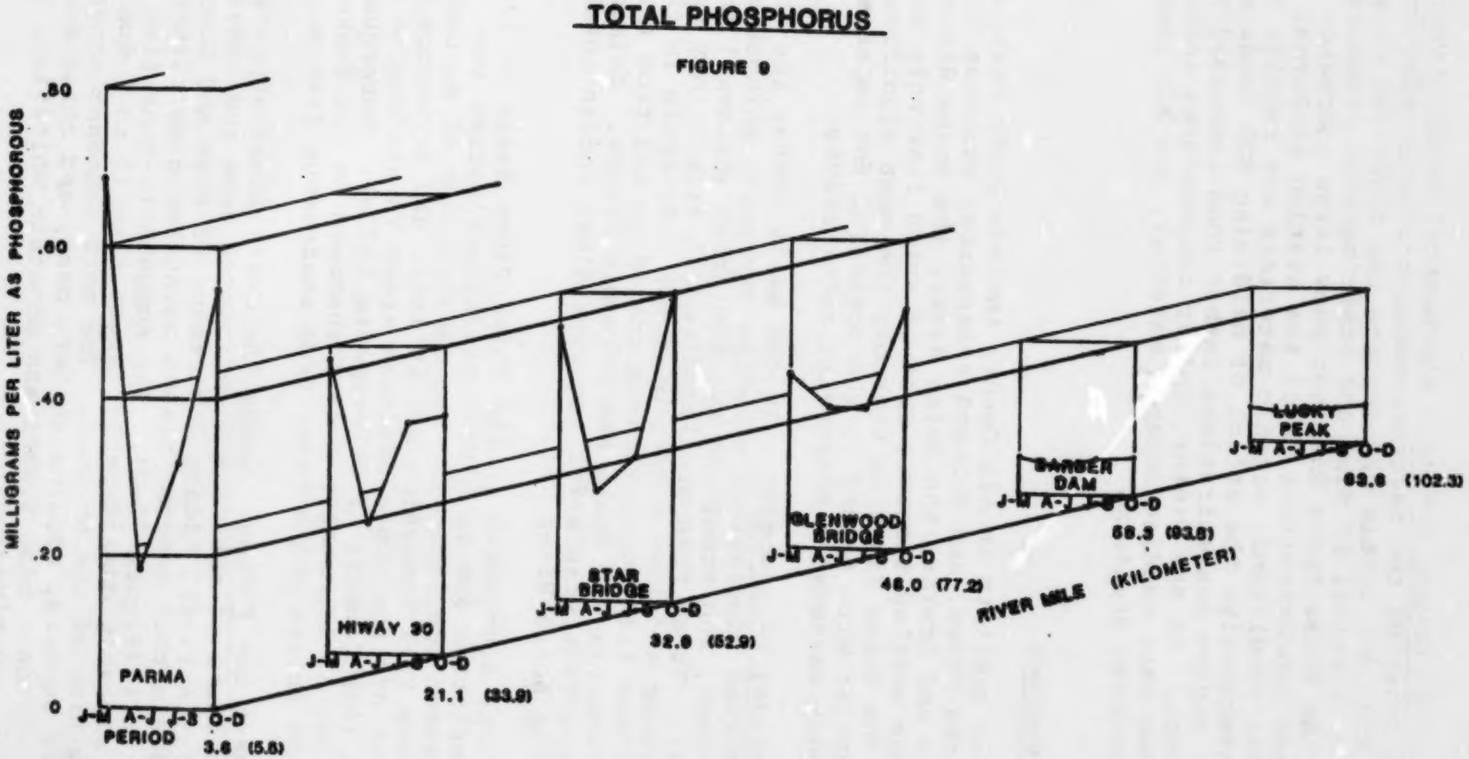


Figure 11-6. Total phosphorus conditions, Boise River.

SOURCE: USBR 1977.

Biochemical Oxygen Demand. Biochemical oxygen demand (BOD) is an index of the oxygen-consuming organic substances in water. High BOD levels can deplete the dissolved oxygen necessary for survival of fish and other aquatic organisms. The BOD in the Boise River does not show large increases over upstream concentrations until the station at Parma. During summer conditions, organic materials are readily oxidized. Consequently, the effect of oxidizing BOD loads shows up as lower oxygen concentrations rather than increased BOD concentrations. In the winter, colder temperatures inhibit the organisms that oxidize organic material, and BOD increases at the downstream stations.

Fishery Resources

Aquatic habitats in Ada County include Lucky Peak, Indian Creek, Blacks Creek, and Hubbard Reservoirs; numerous irrigation canals and drains; the Boise River; the Snake River; and numerous smaller streams, most of which flow only seasonally. The Boise River is probably the most significant aquatic habitat with regard to the potential for impacts of Ada County wastewater management alternatives.

Historical Perspective. In the early 1800s, the Boise River supported populations of white sturgeon, chinook salmon, sockeye salmon, and steelhead rainbow trout (Caldwell and Wells 1974). These fish are "anadromous" (i.e., they spawn in fresh water and live a part of their life cycle in the ocean). These fish populations migrated to and from the Pacific Ocean via the Snake and Columbia Rivers. Salmon were an important staple for the aboriginal Indian inhabitants of the Boise River Valley.

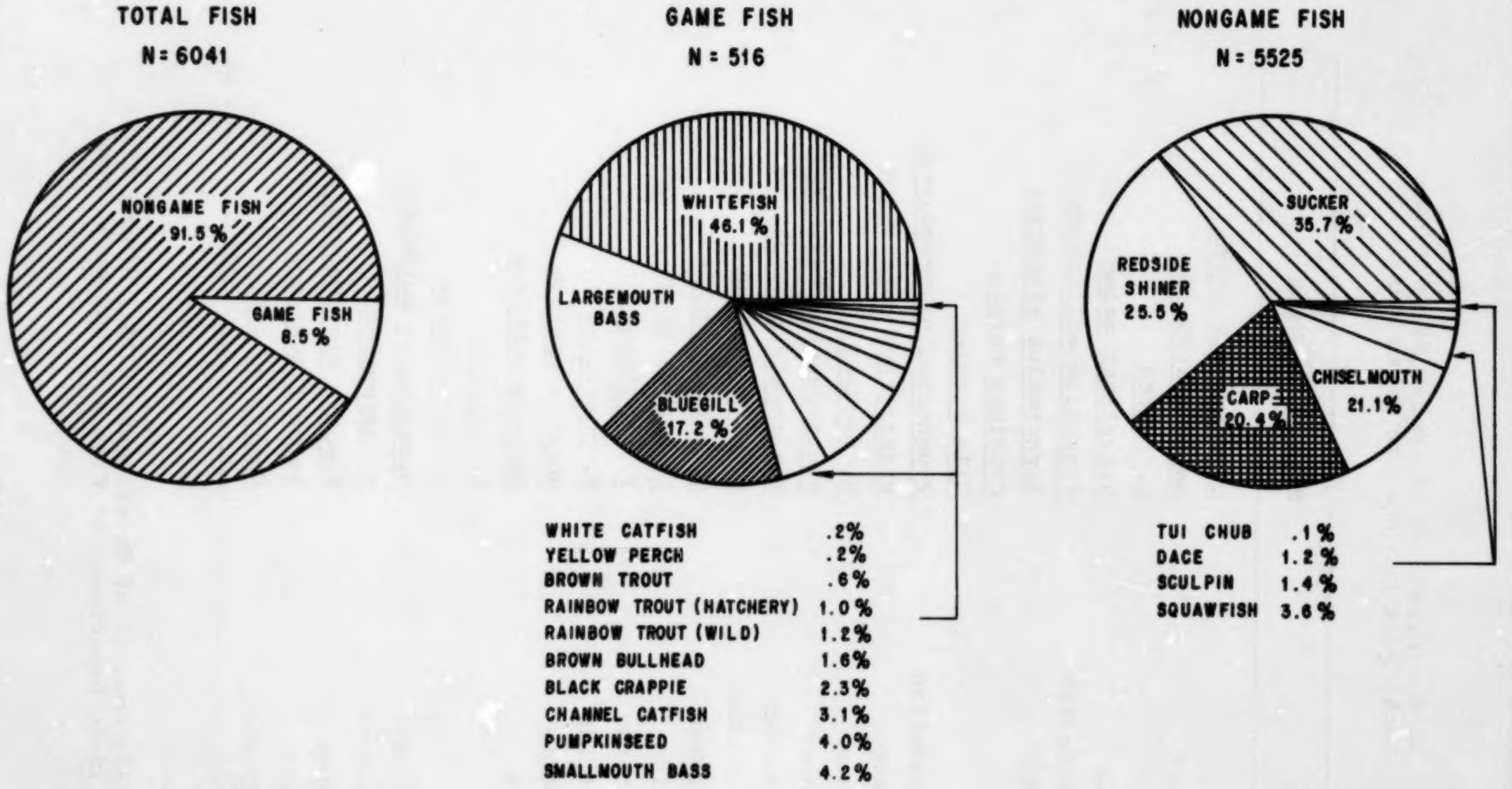
Gold was discovered in the Boise River Basin in 1862, and sedimentation due to placer mining activities soon severely reduced salmon populations. The construction of Barber Dam in 1906, New York Diversion Dam in 1908, and Arrowrock Dam in 1915 cut off the upper drainage areas to anadromous fish migration (Ada Council of Governments 1973a). Subsequent construction of impassable dams downstream on the Snake River cut off the entire Boise River from anadromous fish migrations.

Present Day Fishes. Today the Boise River supports a diverse fauna of native and introduced game and nongame fishes (Table 11-6). Idaho Department of Fish and Game (IDFG) data indicate that nongame fishes outnumber game fishes by about 10 to 1 (Figure 11-7). The nongame-to-game fish biomass ratio is probably considerably larger than 10 to 1 due to the large size of the suckers. The more abundant nongame fishes are suckers, redside shiner, carp, and chiselmouth; the more abundant game fishes are mountain whitefish, largemouth bass, and bluegill.

Table 11-6. Fishes of the Boise River Between Lucky Peak Dam and the River Mouth

Common Name	Scientific Name
Kokanee	Oncorhynchus nerka
Rainbow trout	Salmo gairdneri
Brown trout	S. trutta
Dolly Varden	Salvelinus malma
Mountain whitefish	Prosopium williamsoni
Chiselmouth	Acrocheilus alutaceus
Carp	Cyprinus carpio
Tui chub	Gila bicolor
Northern squawfish	Ptychocheilus oregonensis
Longnose dace	Rhinichthys cataractae
Speckled dace	R. osculus
Redside shiner	Richardsonius balteatus
Bridgelip sucker	Catostomus columbianus
Largescale sucker	C. macrocheilus
Mountain sucker	C. platyrhynchus
White catfish	Ictalurus catus
Brown bullhead	I. nebulosus
Channel catfish	I. punctatus
Tadpole madtom	Noturus gyrinus
Pumpkinseed	Lepomis gibbosus
Warmouth	L. gulosus
Bluegill	L. macrochirus
Smallmouth bass	Micropterus dolomieui
Largemouth bass	M. salmoides
Black crappie	Pomoxis nigromaculatus
Yellow perch	Perca flavescens
Mottled sculpin	Cottus bairdi

SOURCES: Ada Council of Governments 1973a; Gibson 1978; Idaho Department of Fish and Game pers. comm.



SOURCE: GIBSON, 1978

FIGURE 11-7. PERCENTAGE COMPOSITION FOR TOTAL FISH, GAME FISH AND NON-GAME FISH IN ELECTROFISHING SAMPLE FROM THE BOISE RIVER (FROM THE MOUTH, UPSTREAM TO BARBER DAM), 11 JULY TO 2 AUGUST, 1974

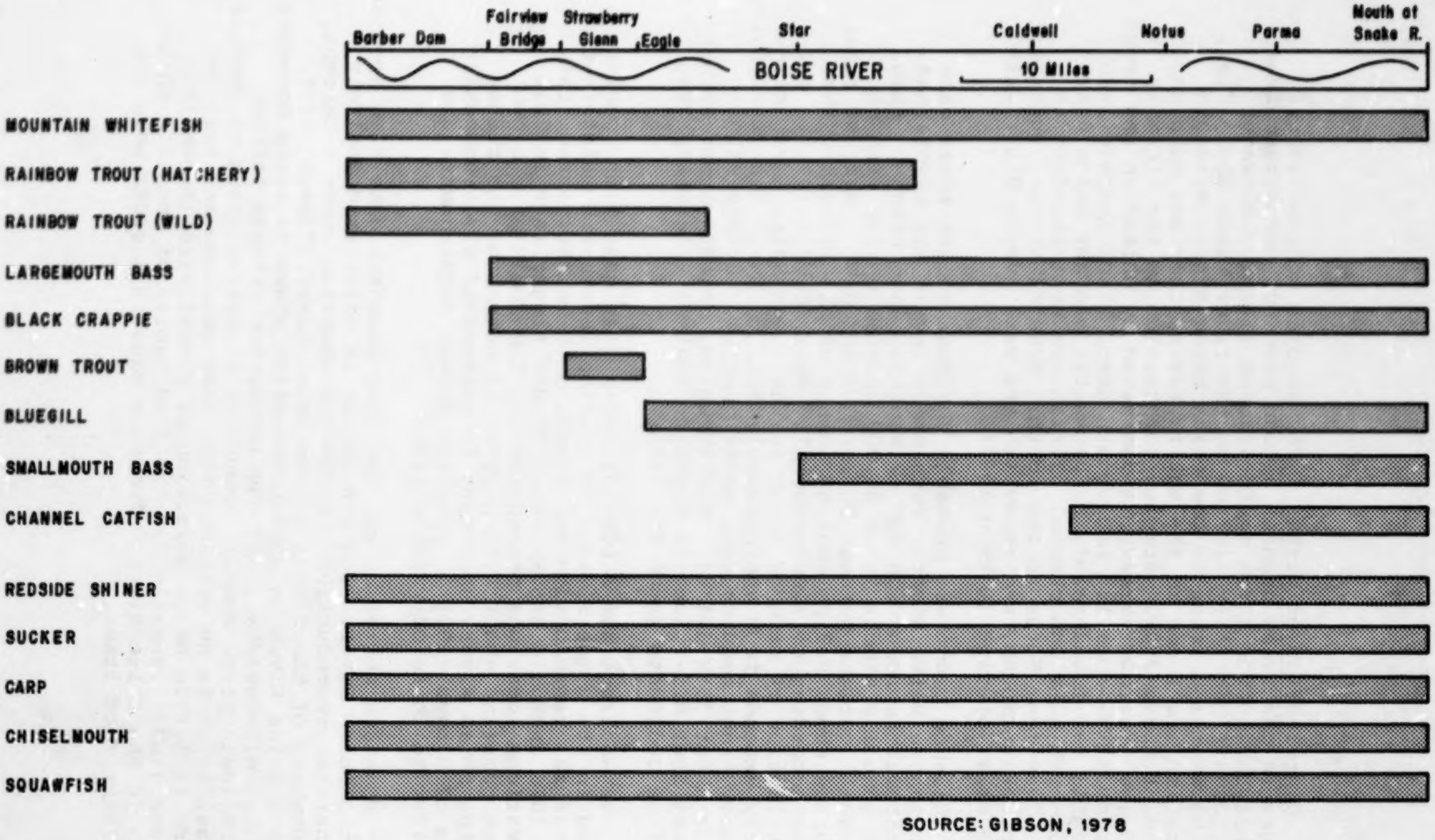
]

Distribution of Fishes. The species composition of fishes in the river changes as one proceeds downstream from Barber Dam to the river mouth (Figure 11-8). Coldwater species are generally limited to the river reach above Star, and warmwater species to the reach below Star. Although whitefish are found in the entire river, they are much more abundant above Star. Species composition in the vicinity of Boise State University is dominated by whitefish and trout (Kelley pers. comm.). Largemouth bass, black crappie, and bluegill are found mainly in backwater sloughs below Star. Smallmouth bass and channel catfish are most abundant in the river from Notus to the mouth. Redside shiner, suckers, carp, chiselmouth, and squawfish are more evenly distributed than other species (Gibson 1978).

Rainbow trout are probably the most sought after game fish in the Boise River. Population levels are maintained by natural reproduction and by stocking with hatchery fish. IDFG annually stocks about 30,000 catchable size fish at various locations between Barber Dam and Star. Rainbow trout comprise about 0.3 percent by number of all fishes in the river according to electroshocking data (Gibson 1978). The distribution of rainbow trout in the lower Boise River presently extends from approximately Star to Lucky Peak Reservoir. Rainbow trout require good water quality and temperature below about 70°F (21°C). For spawning, rainbow trout require gravel abut 0.5-1 inch in diameter that is relatively free of fine sediments (sand and silt).

Brown trout are a popular non-native game fish species found in the Boise River. Population levels are maintained by natural reproduction and stocking of hatchery-bred fish. The IDFG annually stocks about 25,000 fingerlings in fall in various locations between Barber Dam and Star. Brown trout comprise about 0.01 percent by number of the fishes in the Boise River, according to year-round electroshocking data of Gibson (1978). Spawning gravel requirements are similar to those of rainbow trout.

Mountain whitefish are the most abundant game fish species in the Boise River. The population is maintained entirely by natural reproduction. Whitefish comprise about 4 percent, by number, of the fishes in the Boise River (Gibson 1978). In the Boise River, mountain whitefish spawn in early November through mid-December, and egg incubation extends through March (Reid pers. comm.). Mountain whitefish spawn in gravelly areas; there is no evidence that they excavate any nest and there is little or no selection of gravel size (Brown 1952). Gibson (1978) investigated the food habits of mountain whitefish in the Boise River. Immature aquatic insects were the dominant food items.



SOURCE: GIBSON, 1978

FIGURE 11-8. DISTRIBUTION OF 13 FISH SPECIES IN THE BOISE RIVER FROM BARBER DAM DOWNSTREAM TO THE MOUTH AS DETERMINED BY ELECTROFISHING DURING JANUARY-FEBRUARY, JULY-AUGUST AND OCTOBER, 1974

Both trout and whitefish are characteristic of cool, relatively pollution-free streams, and feed mainly on terrestrial and aquatic invertebrates. Although there is little information on specific habitat requirements and relative resistance to various kinds of pollution for whitefish and trout, they are presumably about the same in habitat requirements and resistance to various types of pollutants.

The great difference in relative abundance between trout and whitefish in the Boise River can be explained by a single significant difference; trout bury their eggs, while whitefish (and all other fish species in the Boise River) do not (Brown 1952). Sediments hinder water circulation to the buried eggs. Sediment characteristics thus appear to be a factor limiting reproduction of rainbow and brown trout in the Boise River. There is little gravel of the proper sizze above Boise, and the suitable gravels below Boise are rendered unusable by sedimentation. Other limiting or regulating factors (e.g., lower winter flows and high pollutant loads) during other fish life stages probably affect trout and whitefish more equally.

Human Factors Affecting Aquatic Life. Human-induced changes in the hydrology and sediment budget of the Boise River greatly affects its aquatic life, as discussed below.

Hydrology. The annual stream flow regime of the Boise River has been greatly altered by dam operations and diversions for agriculture and as a result the Boise River below Lucky Peak Dam has: 1) lower winter base flows; 2) reduced winter and spring flood peaks; 3) summer flows that are higher than natural near the upper and lower parts of the river, but lower in the middle near Star; and 4) drastic short-term flow fluctuations. Urbanization, overgrazing, and off-road vehicle use have probably increased flood peak flows and sediment loads in undammed smaller tributary streams such as Cottonwood Creek and Five Mile Creek.

These hydrologic changes have multiple effects on the fish populations. Lower winter flows cause less pollutant dilution and dispersion. They also promote formation of ice cover which hinders oxygen transfer and which, in turn, may increase the effects of waste discharges and occasional pollutant spills during winter. Periodic fish kills in the river were more common in the past. Many industrial waste discharges have been eliminated or treated in recent years (Ada Council of Governments 1973a). Short-term flow fluctuations or complete flow shut-off for maintenance of the outlet structure of Lucky Peak Reservoir strands fish and aquatic invertebrates in pools and makes them more vulnerable to pollution.

These adverse effects can be mitigated in part by revising the flow regime through Lucky Peak Dam. The recommended minimum flow regime published by the U. S. Fish and Wildlife Service Cooperative Instream Flow Service Group for maintenance of fishery resources is presented in Table 11-7. Comparison of actual flow frequencies to the recommended flow (Figure 11-9) indicates spawning flows for rainbow trout are generally met, but spawning flows for brown trout are not met.

On June 10, 1980, the Federal Energy Regulatory Commission (FERC) issued a license to the Boise Project Board of Control for new hydropower facilities on Lucky Peak Dam. A continuous minimum flow release of 160 cfs was a condition of the permit. This would have enhanced fishery habitat in the river. However, on October 9, 1980, FERC issued an order repealing the minimum flow release condition. The repeal was based on difficulties with the integrated management of Lucky Peak, Arrowrock, and Anderson Ranch Reservoirs.

The low-flow situation in the Boise River should improve considerably if and when the hydropower project is completed; there will be two outlets and flow shutdowns for tunnel maintenance will be unnecessary.

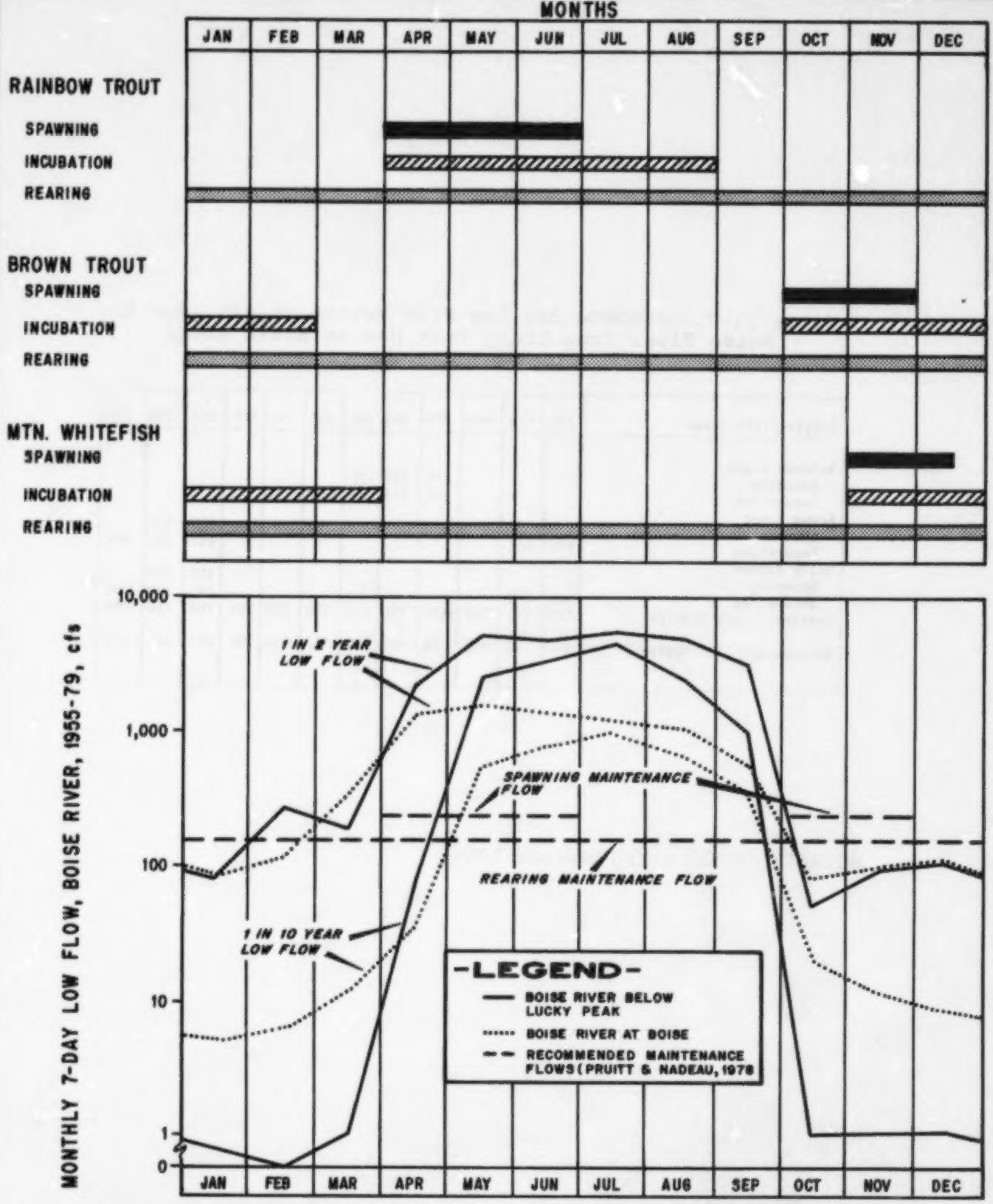
Sediment. Changes in the sediment budget of the Boise River have resulted from the factors identified below:

- o Arrowrock, Lucky Peak, Diversion, and Barber Dams have blocked gravel recruitment from upstream areas. Periodic high flows have flushed smaller gravels downstream, leaving only large gravels and rocks. This "armoring" of downstream areas leaves them with gravels too large for trout spawning use. Most suitable spawning gravels (about 0.5 inch diameter) exist in higher side channel areas, and flows greater than about 1,000 cfs are necessary to provide suitable water depths and velocities over them. Rainbow trout spawn in these gravels during high flow periods of spring, but the nests become exposed due to rapidly falling water levels during summer, and the eggs die (Pruitt and Nadeau 1978). Limited amounts of proper-size spawning gravels are transported to the main stem of Boise River by tributaries downstream of Boise area, such as Indian Creek (Nadeau pers. comm.).
- o The reach between Lucky Peak Dam and Barber Dam has received extensive sand deposits from mining operations in the More's Creek watershed in the 1930s and 1940s. These deposits stifle aquatic insect productivity and are unsuitable for trout spawning (Ada Council of Governments, 1973a).

Table 11-7. Recommended Low Flow Regime in cfs, for the Boise River from Lucky Peak Dam to Snake River

Species/Life Stage	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Rainbow Trout												
Spawning				225	225	225						
Incubation				151	151	151	151	151				
Brown Trout												
Spawning										225	225	
Incubation	151	151								151	151	151
Dolly Varden												
Spawning										150	150	
Incubation	100	100								100	100	100
Rearing - All Species	150	150	150	150	150	150	150	150	150	150	150	150
Recommended Flow Regime	150	150	150	225	225	225	150	150	150	225	225	150

SOURCE: Pruitt and Nadeau 1978.



SOURCES: PRUITT & NADEAU, 1978, USGS FLOW DATA (FILE); REID (PERS. COMM.)

FIGURE 11-9. COMPARISON OF TROUT AND WHITEFISH LIFE HISTORY, STREAMFLOWS IN THE BOISE RIVER AND RECOMMENDED MAINTENANCE FLOWS

- Fine sediments from sites of overgrazing and construction activities, stream channel alterations, and irrigation return flows are deposited in the river. Urban development in the Boise foothills and gravel crushing operations are especially deleterious (Ada Council of Governments 1973b). Sedimentation renders stream gravels unproductive of aquatic insects and unsuitable for trout spawning due to the clogging of gravel interstices and blockage of water circulation and oxygen transfer.

These changes in sediment budget may affect fish species composition. Boise River fish sampling data (Gibson 1978) show that game fish were 9.5 percent of the total fish population, and of the game fish, 46 percent were mountain whitefish, 2.2 percent were rainbow trout, and 0.6 percent were brown trout (see Figure 11-7).

Impacts of the Proposed Projects

Hydrologic Changes

The Lander Street and West Boise sewage treatment plants are projected to treat and dispose of an annual average of 32.3 MGD of wastewater by the year 2000. During the fall and winter low flow period, the year 2000 Lander Street discharge will be about 10 MGD (15.5 cfs) and the West Boise discharge will be about 22 MGD (34.0 cfs). The Eagle Sewer District plant will discharge about 1.3 MGD (2.0 cfs). Table 11-8 summarizes the effects of these discharges during 1-in-10-year, 7-day low-flow periods. As shown in Table 11-8, the West Boise discharge will have the greatest relative effect on Boise River flows. It is presently uncertain where the Eagle effluent will enter the river. However, the effects of the Eagle effluent on total river flow will not be significant.

Development accommodated by expanded sewage treatment facilities in the Boise area will result in an increase in storm runoff from impervious surfaces. Increased storm runoff will result in somewhat higher river flows after significant storms.

Water Quality Changes

The following discussion focuses on the water quality effects of the Lander Street and West Boise discharges. Water quality data are not available for the vicinity of the present Eagle Sewer District plant. That facility has met NPDES permit requirements except for suspended solids during algal blooms in the treatment ponds (J-U-B Engineers 1980). Construction of the proposed new treatment facilities

Table 11-8. Present and Future Effects of Boise and Eagle Effluent Flows on Boise River 1-in-10-year, 7-Day Low Flows Below the Outfalls (Lucky Peak Flow = 80 cfs)

	Lander Street	West Boise	Eagle
Present Conditions			
Upstream flow	100	65	67
Effluent flow	16	7	0.5
Downstream flow	116	72	67.5
(Percent local effluent flow)	14	10	1
(Percent cumulative effluent flow)	14	21	13
Year 2000 Conditions			
Upstream flow (cfs)	100	65	67
Effluent flow (cfs)	16	34	2
Downstream flow (cfs)	116	99	69
(Percent local effluent flow)	14	34	3
(Percent cumulative effluent flow)	14	42	14

Notes: cfs = cubic feet per second

DATA SOURCE: Morrison pers. comm.; J-U-B Engineers 1980.

at Eagle will alter the location of effluent discharge to the river. If the recommended rapid infiltration project is built, collected percolate from the infiltration site will be mixed with agricultural drain water prior to eventual discharge. If the alternative oxidation ditch system is built, effluent discharge will occur about 1 mile west (downstream) of the current discharge. In either case, there should not be any significant effects on overall river water quality due to the low volume of effluent.

Present Effluent Effects. Water quality data are collected above and below both the Lander Street and West Boise outfalls. Average data are shown in Table 11-9. Increases in ammonia and phosphate occur below the Lander Street outfall, while dissolved oxygen concentrations decrease. Temperatures increase slightly. The change in river quality due to the West Boise discharge is not as pronounced for many constituents as at the Lander Street plant. Phosphate levels show the greatest relative increase.

Dissolved Oxygen Changes. Figure 11-10 shows dissolved oxygen levels projected to exist in the Boise River under year 2000 conditions of effluent flow and quality. Dissolved oxygen levels are projected to be above the 75 percent of saturation standard at all locations. The minimum dissolved oxygen saturation was 82 percent, which corresponds to 8.4 mg/l at 15°C. This is a level sufficient to support a healthy fish community.

Nutrients. Effluent loading of nitrogen and phosphorus are of concern for potential stimulation of nuisance algal growths in Snake River reservoirs downstream of the Boise River, including Brownlee Reservoir. Nitrogen loadings to the Boise River under 1-in-10-year, 7-day low-flow conditions were estimated when the river dissolved oxygen modeling was performed (Table 11-10). Lander Street, West Boise, and Eagle will contribute about 10, 12, and 1 percent, respectively, of the total nitrogen load. The present contributions are about 10, 4, 0.3 percent, respectively. Total phosphorus loadings to the Boise River under present and future conditions are estimated in Table 11-11. Phosphorus loadings from the Boise and Eagle effluents will about double. The percentage of the total load including tributaries and drains will increase from the present 30 percent to about 47 percent.

These nutrient increases will contribute to higher algal growth levels in reservoirs downstream of the Boise River. If control of these growths is desired, control of nutrients from Boise and Eagle should be considered.

Inorganic Toxins. Heavy metal loadings to the Boise River are not presently a problem. STORET data show that metals concentrations above and below the Lander Street and West Boise discharges are generally undetectable. There

Table 11-9. Average Water Quality Data Above and Below Lander Street and West Boise Sewage Treatment Plant Outfalls, October 1975-April 1980

		Above Lander St.	Below Lander St.	Above W. Boise	Below W. Boise
Temp. °C	I	10.6	10.8	11.8	11.5
	N	6.0	6.7	6.4	6.6
pH	I	7.4	7.4	7.5	7.5
	N	7.5	7.5	7.6	7.6
Dissolved O_2 mg/l	I	9.9	9.3	9.0	8.9
	N	10.2	9.5	8.7	9.5
NH_3-N mg/l	I	0.12	0.34	0.12	0.09
	N	0.22	0.94	0.50	0.43
PO_4 mg/l	I	0.22	0.47	.34	.43
	N	0.23	0.85	.72	1.04

NOTES:

I = Irrigation season (April-September)
N = Nonirrigation season (October-March)

SOURCE: City of Boise (Lander Street Wastewater Treatment Plant file data).

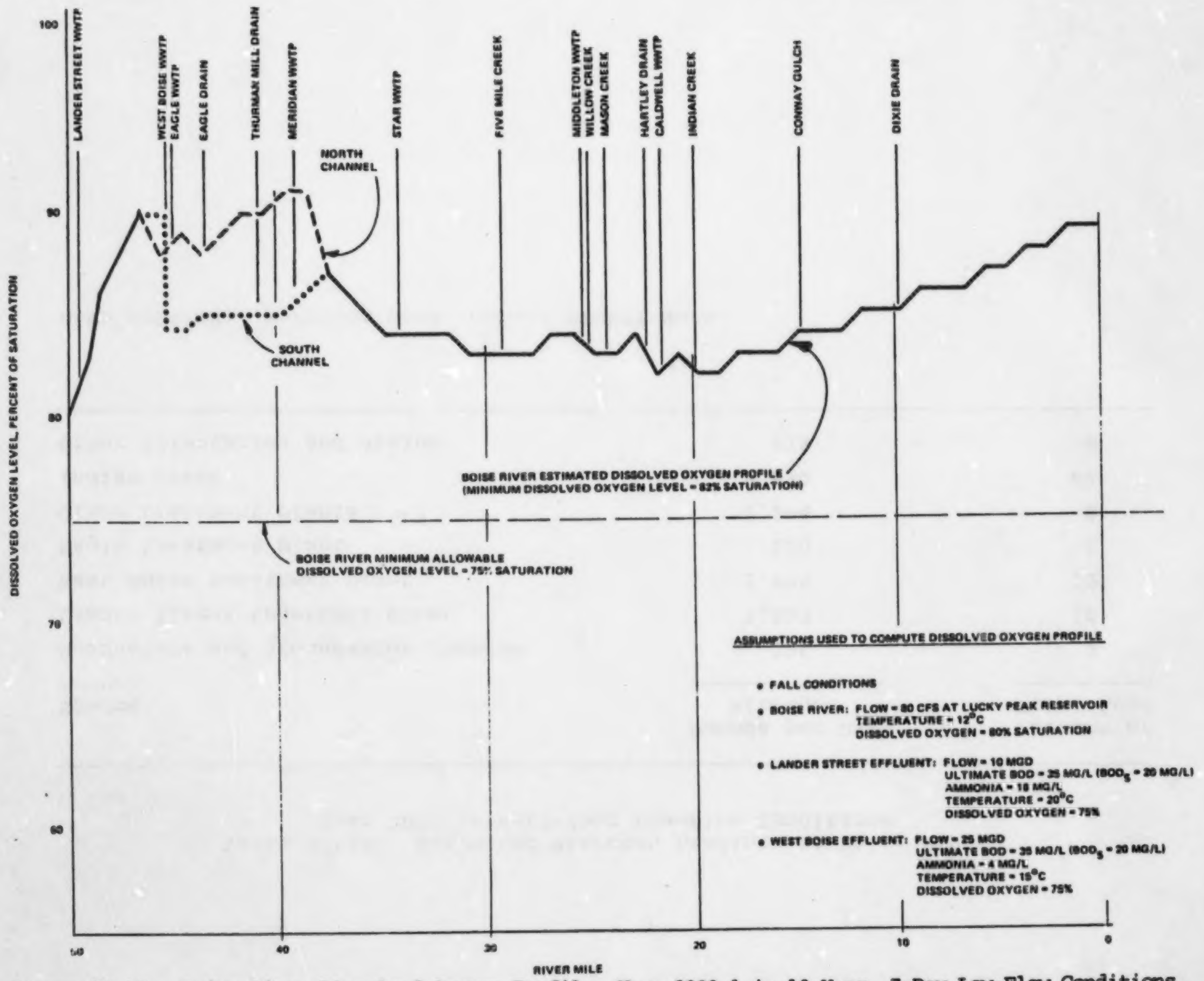


Figure 11-10. Boise River Dissolved Oxygen Profile, Year 2000 1-in-10-Year, 7-Day Low-Flow Conditions.
SOURCE: CH2M Hill 1980c.

Table 11-10. Estimated Nitrogen Loadings to Boise River, Year 2000 1-in-10-Year Low-Flow Conditions

Source	Pounds per Day Nitrogen	Percent of Total Load
Headwaters and groundwater seepage	385	2
Lander Street treatment plant	1,507	10
West Boise treatment plant	1,909	12
Eagle treatment plant	100	1
Other treatment plants	1,294	8
Indian Creek	9,590	61
Other tributaries and drains	879	6

DATA SOURCES: Morrison pers. comm.; STORET data.

Table 11-11. Annual Average Loadings of Total Phosphorus to the Boise River under Present and Future Conditions

	Present P Load to River		Year 2000 P Load to River	
Tributaries and Drain	lb/day	Percent	lb/day	Percent
Isham	4			
Ridenbaugh	8			
Baxter	2			
Davis	35			
Eagle	35			
Dry Creek	25			
Thurman	18			
Fish Hatchery	2			
Mason Creek North	6			
Mason Creek South	6			
Mason Drain	239			
North Middleton	51			
South Middleton	167			
Willow Creek	45			
Hartley Drain	92			
Hartley Gulch	42			
Conway	106			
Dixie	436			
Wilder	16			
Indian Creek	333			
Tenmile Creek	184			
Sewage Treatment Plants				
Lander Street	500	19	500	14
West Boise	275	10	1,100	31
Eagle	25	1	65	2

DATA SOURCES: USBR 1977; STORET data.

is concern for future heavy metals concentrations below West Boise due to the new Hewlett-Packard plant. Effluent limitations for metals and other inorganic toxins from the West Boise plant have been formulated by IDHW. Table 11-12 shows estimated instream concentrations of these substances during a 1-in-10 year, 7-day low flow event in the year 2000. No constituent would be greatly increased, and some would be decreased by the effluent discharge. No EPA (1976) water quality criteria for freshwater aquatic life would be exceeded.

Construction Impacts. Construction of expanded sewage treatment facilities and interceptor lines in Boise and Eagle will result in short-term local increases in erosion and sedimentation in the vicinity of the construction sites. The Eagle interceptor will cross several watercourses. The south Boise interceptor route alternatives that run along the Boise River appear to have greater sedimentation impact potential than the inland east route (CH2M Hill 1980c).

Direct Impacts On Fisheries

Expansion of the Boise and Eagle wastewater treatment facilities is not expected to have any significant adverse effects on the fish populations of the Boise River as long as the water quality standards are met. The facilities plan (CH2M Hill 1980c) indicates that receiving water quality standards can be met as long as flow releases from Lucky Peak Dam equal or exceed 80 cfs, which is the anticipated 1-in-10 year low flow. However, additional assurance is needed that 80 cfs will continue to be available during the 20-year life of the project, since part of that supply has already been appropriated to the U. S. Bureau of Reclamation and is subject to sale to irrigators. If the 1-in-10-year flow of 80 cfs is assured, then no significant effects on fish populations will occur in 90 percent of all years. In the other 10 percent of all years (the lowest 10 percent in terms of water flow) some adverse fisheries impacts may occur, depending on how far below 80 cfs releases from Lucky Peak go. The potential for adverse effects on fishes due to residual chlorine will decrease with the installation of dechlorination facilities at the Boise wastewater treatment plants.

Construction will have short-term effects on fisheries due to sedimentation and disturbance of riparian vegetation. Fisheries may be permanently affected if riparian vegetation is removed, particularly at the Eagle site where riparian vegetation is abundant.

Table 11-12. Estimated Instream Concentrations of Trace Inorganic Toxins Below West Boise, Year 2000 1-in-10-Year, 7-Day Low-Flow Conditions*

Constituent	Effluent Limitation (mg/l)	Upstream Concentration (mg/l)	Downstream Concentration (mg/l)	EPA (1976) Aquatic Life Criterion (mg/l)
Arsenic	0.01	<0.01	<0.01	-
Aluminum	0.1	0.28	0.22	-
Baron	0.3	0.15	0.20	-
Cadmium	0.001	<0.01	<0.01	0.004
Chromium, Total	0.01	<0.01	<0.01	0.1
Chromium, Hexavalent	0.01	<0.01	<0.01	-
Copper	0.02	<0.01	<0.013	0.1 of LC_{50}
Cyanide	0.01	no data	-	0.005
Fluoride	0.5	0.43	0.45	-
Iron	0.3	0.36	0.34	1.0
Nickel	0.05	<0.50	<0.5	0.01 of LC_{50}
Zinc	0.06	0.005	0.024	0.01 of LC_{50}

*River flow = 65 cfs; Effluent flow = 34 cfs

DATA SOURCES: STORET AND IDHW data.

Indirect Impacts on Fisheries

Indirect impacts on fish and wildlife resources will result from the population growth and attendant land use changes associated with provision of new or expanded sewerage facilities. The principal indirect impacts on fisheries accompanying provision of sewerage facilities in Ada County will be nonpoint source pollution resulting from urban expansion. Nonpoint source pollution includes sediment, oil and grease, rubber particles, metals, and a host of other toxic or oxygen-demanding substances. Many of these pollutants are generated through urban storm runoff. There is no coordinated implementation of a master storm drainage plan in Ada County at the present time. Increased fishing pressure may also affect populations.

Sedimentation is a major water quality problem in the Boise River, especially below Boise. Fine sediments that clog spawning gravels limit the natural reproduction of rainbow and brown trout in the river reach below Boise. Construction associated with population growth may worsen the problem. Insufficient data exist at this time to quantify the present nonpoint source problem or to quantify future loads and their effects.

Mitigation Measures

The 1-in-10-year low flow of 80 cfs from Lucky Peak is not assured, i.e., flows lower than 80 cfs may occur. The City of Boise should continue its efforts to assure reliable flows from Lucky Peak Dam.

Construction impacts should be minimized by using earthmoving practices which minimize land disturbance and movement of sediment toward watercourses. Riparian habitat along the Boise River should be preserved to the maximum possible extent during construction. The Boise facility planners have already met with Idaho Department of Fish and Game regarding minimization of construction impacts (CH2M Hill 1980c).

A master storm drainage plan for Ada County is needed to help control urban runoff and nonpoint source pollution.

Provisions for nutrient removal from sewage effluent may be desirable in the future to help control algal growth in downstream Snake River reservoirs.

Chapter 12

VEGETATION AND WILDLIFE RESOURCES

Environmental Setting

In the following section describing the plant and animal communities of the study area, special attention is given to: 1) habitats of major importance to wildlife, 2) habitats and wildlife that may be impacted by the proposed projects, and 3) plant and animal species of special concern (e.g., endangered species, recreation species). Representative plant and animal species of Ada County are listed by common and scientific name in Appendix E.

Vegetation and Wildlife Habitats

Wildlife Habitat Types. Nine general plant community or wildlife habitat types occur in northern Ada County: 1) riparian, 2) big sagebrush, 3) bitterbrush shrub steppe, 4) irrigated agricultural, 5) nonirrigated agriculture, 6) open water, 7) grassland, 8) Douglas-fir, and 9) urban-industrial (Idaho Department of Fish and Game 1977).

Riparian. Riparian habitat is densely wooded, typically supporting cottonwoods, willows, wild roses, bulrushes, horsetails, cattails, and a variety of forbs and grasses. Riparian areas provide excellent wildlife habitat with their mix of water, wildlife forage plants, and cover. Riparian habitat occurs along the Boise River, except where the river flows through the densely developed areas of the City of Boise. One stretch of riparian habitat extends from Barber Flats downstream through the Barber Pool area to the southern end of the Warm Springs Golf Course. The Barber Pool area supports approximately 650 acres of riparian habitat. Immediately downstream of the Strawberry Glen Airport in Garden City lies approximately 225 acres of riparian habitat. A 130-acre stand of riparian habitat occurs on the north channel of the Boise River southwest of Eagle. Except for these three areas, the riparian community is seldom very wide (>25 yards) upstream from Eagle; in many cases the riparian vegetation is absent or only a few trees wide. Riparian vegetation formerly extended further inland from the active river channel, but has been replaced by agricultural or urban-industrial uses. Downstream from the Eagle area to Caldwell, the strip of riparian vegetation is usually wider than that along the river near Boise. Riparian habitat also occurs along some of the tributary creeks draining the Boise Front.

Sagebrush, Bitterbrush, and Grasslands. Prior to urbanization and agricultural development in Ada County, most of the county was brushland or grassland. Riparian habitat occurred along the rivers, and forests were found in the high mountains.

Bitterbrush-dominated shrubland presently occurs at midelevations of the foothills north and east of Boise. Sagebrush-dominated shrubland occurs in the foothills above and below the bitterbrush communities, as well as comprising most of the vegetation of southern Ada County. Grasslands occur north of the Boise River and southeast of Boise, and in small, scattered locations elsewhere in the county. In addition, various grasses form part of the understory for the forests and shrublands. Cheatgrass, crested wheatgrass, bluebunch wheatgrass, Idaho fescue, and Indian ricegrass are among the county's common grasses.

Agriculture. Large tracts of irrigated farmland lie west of Boise and Eagle. Other scattered irrigated and nonirrigated agricultural lands lie in eastern Ada County and in southwestern Ada County near the Snake River. In the last 10 years, large parcels of agricultural land southwest of Boise have been converted to housing and other urban uses.

Corn is the primary row crop in the county. Alfalfa, grains, sugar beets, and mint are among the other crops. Irrigation is accomplished through furrow and large moving sprinkler systems. Livestock production and dairies are additional agricultural activities.

Open Water. Open water habitats are the surface waters of lakes, reservoirs, and streams. Riparian habitat often occurs around the edges of such areas. Lucky Peak Reservoir, Lake Lowell, Indian Creek Reservoir, and the Boise River are examples of open water habitat. Large sewage treatment ponds also serve as open water wildife habitat.

Douglas-Fir. Along the upper crest of the Boise Front in northeastern Ada County, Douglas-fir and ponderosa pine are the dominant plants. The forest community formerly extended farther downslope and into some lower drainages; fires and timber harvest have limited the forest to the higher slopes

Urban-Industrial. Boise, Garden City, Eagle, Meridian, Star, and Kuna, as well as development in unincorporated areas, comprise the urban-industrial habitats of Ada County.

Within the Boise River floodplain, many areas support relatively large trees. Parks, golf courses, and various open space areas provide a combination of natural and artificial (e.g., landscaping) vegetation within the urban complex.

Threatened and Endangered Plant Species. Two plant species are listed as candidates for threatened or endangered status by the U. S. Fish and Wildlife Service (Table 12-1). Mulford's milk vetch and Hannah aase's onion are currently under going evaluation to identify locations of populations, number of plants, degree of endangerment, and other parameters which will help to determine the status of these plants. The U. S. Fish and Wildlife Service (Merhoff pers. comm.) expects to officially propose these species for threatened or endangered listing in the near future.

Both plant species are closely associated with soils of sedimentary origin; locally these soils are found in a narrow band at the base of the foothills north and east of Boise (Steele pers. comm.; U. S. Soil Conservation Service 1979). Because these plants are closely associated with a specific limited soil type, it is unlikely that further surveys will discover numerous additional populations or broaden their known distributions.

Mulford's milk vetch historically has been identified on 10 sites; but, only two populations have been recently verified (Kennison 1980). Threats to this species are conversion of native habitat to agriculture, excessive grazing pressure, and urban development.

Hannah aase's onion has 10-12 known populations. Its means of reproduction is by bulb division. A sexual reproduction (bulb division) in this species has promoted uniformity among plants within individual populations and notable differences among populations. Maintenance of different populations is crucial to maintenance of the genetic variation of the species. The total range of this plant is approximately 5 miles by 20 miles. Threats to the continued existence of this species are urban development and gravel extraction (Packard 1979).

Wildlife

A variety of wildlife species utilize the habitats of Ada County, either seasonally or year-round. Many species are migratory, occurring in the county primarily during one season or passing through the county briefly in spring or fall. Deer, for example, summer in the high mountains, and winter at lower foothills (because snow excludes them from

Table 12-1. Vegetation - Candidate Threatened or Endangered Plant Species[1,2,3]

Plant Name (Scientific/Common)	Proposed Status[4]	Known Locations	Plant Community	Elevation, Slope, Soils	Comments
Astragalus mulfordiae Mulford's milkvetch	T[5]	Foothills east of Boise; Owyhee, Washington Counties in Idaho; Malheur County, Oregon; 5 sites.	Steppe, shrub-steppe desert shrub, sagebrush-grass. Plant associates include sagebrush, bitterbrush, fescue, wheatgrass.	2,000-3,000 feet; level to moderate slope; sandy soils, particularly along old river deposits.	Seldom abundant where it occurs, and sites usually very small.
Allium aaseae Hanna Aase's Onion	E	Known only from the foothills in the vicinity of Boise and Emmett; 10-12 sites.	Immediate habitat bare, bordered by bitterbrush and buckwheat; surrounding community is sagebrush-grass.	2,850-4,400 feet; slope usually steep, most often on eroding faces of river terraces; gravelly and sandy soils, sedimentary in origin.	Plants usually abundant on proper habitat, but such sites very restricted. Narrow habitat suitability indicates most of potential habitat is probably occupied; no potential alternate range.

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[1] See Table 10-3 for definition of threatened or endangered

[2] A total of 23 and 45 plant species in Idaho have been previously proposed for endangered or threatened status, respectively, by the U. S. Fish and Wildlife Service, Office of Endangered Species (Federal Register: June 16, 1976; July 1, 1975). The list of proposed species expired December 10, 1979. Species that had not either been officially designated threatened/endangered or deleted from the proposed list remained candidate species. Status of candidate species are continuing to be reviewed; as a result some species have been officially reproposed (and officially listed in some cases). The two candidate species listed above are undergoing evaluation and will be officially proposed for threatened or endangered listing in the near future. Two other species included in the initial proposals (Draba douglasii and Primula cusickiana) have been recommended for deletion from further threatened or endangered consideration (Merhoff pers. comm.).

[3] Data Sources: Henderson et al. (1977); Packard (1979); Kennison (1980).

[4] Status listed in expired proposals (see note 2 above). T = threatened; E = endangered.

[5] Henderson et al. (1977) recommended changing status to endangered.

the higher elevations). Reptiles, on the other hand, are year-round residents because of their restricted mobility.

Wildlife by Habitat Type. Some of the characteristic or common wildlife species inhabiting each of the county's habitats are discussed below. Some wildlife species are closely associated with a given habitat, whereas other species occupy several habitats.

Riparian. Riparian habitat generally supports a more diverse wildlife population than any other habitat type because of the diversity of food and cover plants and the availability of water.

Muskrats and beavers have been reported in the Barber Pool area. Raccoons, deer, skunks, and foxes typically inhabit riparian areas.

The most visible component of the wildlife community in riparian areas is the various water-associated birds. Great blue herons, Canada geese, mallards, green-winged-teals, belted kingfishers, and killdeer are common on the water and in the adjacent vegetation. Yellow-headed blackbirds, red-winged blackbirds, and quail may be observed in the adjoining upland areas. Black-billed magpies construct their stick nests in the trees. Great blue herons have established rookeries near Eagle (Figure 12-1) and Star (Ada Council of Governments 1973a). Birds of prey are commonly observed in or near riparian habitat. Bald eagles, ospreys, marsh hawks, and Swainson's hawks have been seen along the Boise River.

Amphibians, such as the spotted frog, are common in riparian areas due to abundant water supplies. Garter snakes and other reptiles may also be observed.

Sagebrush, Bitterbrush, and Grasslands. The arid foothill and southern portion of the county support sagebrush, bitterbrush or grassland habitats. Coyotes commonly occur in these habitats, preying largely upon mice and other small mammals. Deer migrate from the higher mountains into these areas during winter, feeding on the shrubs and other plants remaining uncovered by snow. Badgers, Ord kangaroo rats, Townsend ground squirrels, and black-tailed jackrabbits are among the other common mammals of these habitats.

Brushlands and grasslands are foraging habitats for many birds of prey, such as golden eagles, prairie falcons, kestrels, burrowing owls, and ferruginous hawks. Other birds characteristically inhabiting such areas are sage grouse, long-billed curlews, ravens, horned larks, meadowlarks, and savannah sparrows.

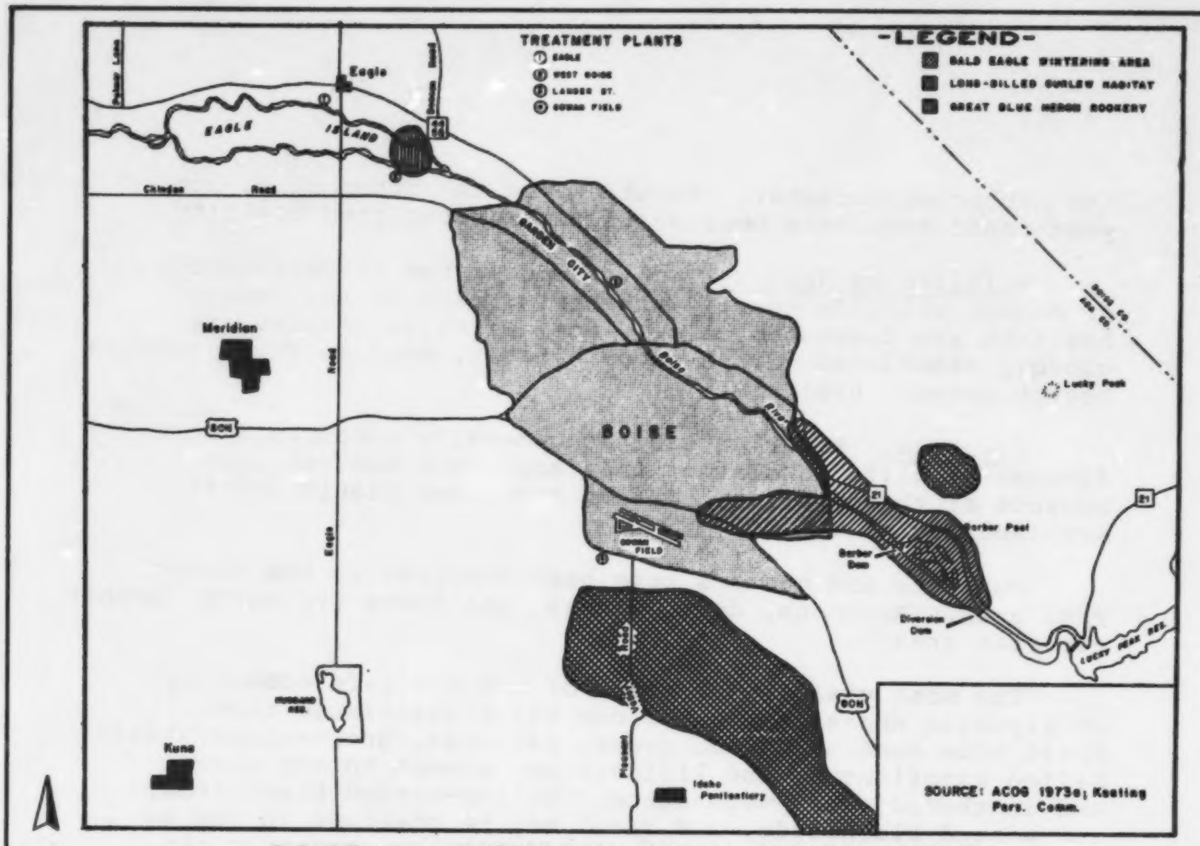
TREATMENT PLANTS
① EAGLE
② WEST BOISE
③ LANDER ST.
④ GOWAN FIELD
-LEGEND-
BALD EAGLE WINTERING AREA
LONG-BILLED CURLEW HABITAT
GREAT BLUE HERON ROOKERY
Eagle
EAGLE ISLAND
Chinden Road
Eagle Road
Glenwood Road
Pleasant Valley Road
Meridian
GARDEN CITY
Boise River
BOISE
GOWAN FIELD
Barber Pool
Barber Dam
Diversion Dam
LUCKY PEAK RES.
Lucky Peak
Boise Co.
Ada Co.
HUBBARD RES.
Kuna
Idaho Penitentiary
80N
21
SOURCE: ACOG 1973a; Keating Pers. Comm.
N

FIGURE 12-1. SPECIES OF SPECIAL CONCERN HABITAT

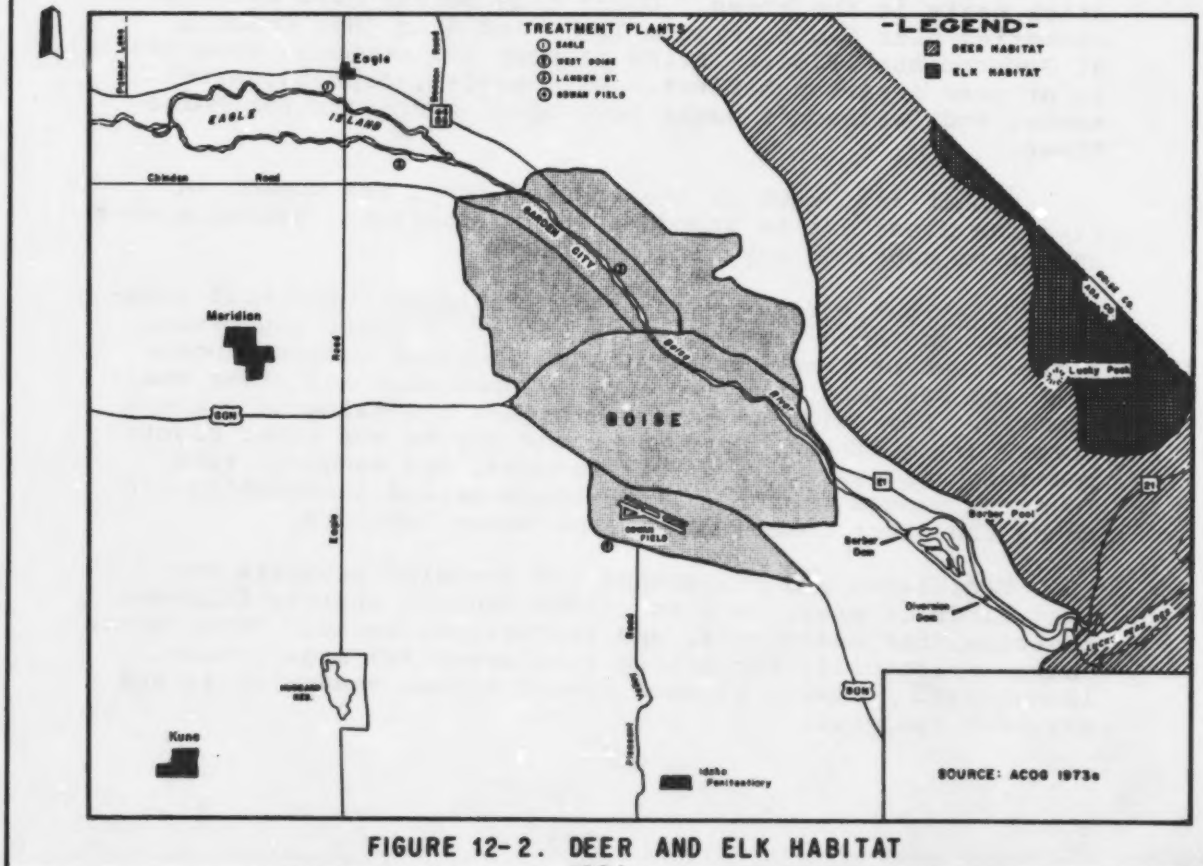
TREATMENT PLANTS
① EAGLE
② WEST BOISE
③ LANDER ST.
④ GOWAN FIELD
-LEGEND-
DEER HABITAT
ELK HABITAT
Eagle
EAGLE ISLAND
Chinden Road
Eagle Road
Glenwood Road
Pleasant Valley Road
Meridian
GARDEN CITY
Boise River
BOISE
GOWAN FIELD
Barber Pool
Barber Dam
Diversion Dam
LUCKY PEAK RES.
Lucky Peak
Boise Co.
Ada Co.
HUBBARD RES.
Kuna
Idaho Penitentiary
80N
21
SOURCE: ACOG 1973a

FIGURE 12-2. DEER AND ELK HABITAT

Western fence lizards, western rattlesnakes, and sagebrush lizards are typical reptiles in this habitat. Amphibians are uncommon because of arid conditions.

Agriculture. Farmland provides suitable habitat for many wildlife species, as long as escape and breeding cover is maintained between and around the fields. Ring-necked pheasant, mourning doves, quail, and cottontail rabbits are major species of agricultural areas. Waterfowl feed on stubble and leftover grain in harvested fields. Marsh hawks, burrowing owls, and coyotes will forage for the mice and other small mammals that live on farmlands. Amphibians occur in the irrigation and drainage ditches.

Open Water. Open water habitats serve as resting and feeding areas for waterfowl and other water-associated birds. Many species remain in the county year-round, breeding and nesting in vegetation adjacent to the water. Barber Pool is an excellent waterfowl breeding area, producing 125-150 Canada geese annually (Ada Council of Governments 1973a). The greatest water-associated bird populations occur during spring and fall migrations. Mallards, green-winged teal, shoveler, California gulls, white pelicans, American avocets, and great blue herons are some of the species using the lakes and streams of Ada County. Osprey and bald eagles forage for fish and bald eagles prey on waterfowl in this habitat.

Douglas-Fir. Mammals inhabiting the Douglas-fir areas include elk, deer, snowshoe rabbits, red squirrels, golden-mantled ground squirrels, porcupines, and bushytail woodrats. Bird species include blue grouse, ruffed grouse, mountain chickadees, pine siskins, and red-breasted nuthatches. Spotted frogs and garter snakes also occur in this habitat.

Urban-Industrial. Wildlife species inhabiting urban areas are tolerant of human activity. Three of the most common species (i.e., house mouse, house sparrow, starling) are introduced. Other species include raccoons, common nighthawks, black-billed magpies, cedar waxwings, and robins.

Threatened Species, Endangered Species, and Species of Special Concern. Four mammal, ten bird and two reptile species designated as endangered or known to be of special concern to governmental agencies or private groups are occasional, seasonal, or year-round inhabitants of the study area. Table 12-2 summarizes the status, habitat requirements, food habits, distribution, and other information regarding these species. Of the listed species, the bald eagle and long-billed curlew are the most likely to be impacted by the current project; these two species are discussed below.

Table 12-2. Terrestrial Wildlife - Endangered and Threatened Species and Species of Special Concern[1]

Common Name	Status[2]	Habitat and Special Requirements[3]	Food Habits[3]	Distribution/Comments[3]
		MAMMALS		
Spotted bat	Sen, PT	Usually arid open or scrub habitat; may enter buildings and caves; highly selective of daily roost sites in cracks and crevices of high cliffs and canyons.	Primarily moths	Extremely uncommon; summer migrant.
River otter	Sen	Riparian habitats along streams and lakes	Fish	Probably few (if any) in Boise River below Lucky Peak Dam.
Kit fox	Sen, Sp Con	Vegetation arid land; open, level sandy ground for burrowing.	Small rodents	Very rare; confined to arid areas in southern portions of the state.
Bobcat	Sen, Sp Con	May occur in most wildlife habitats in county; dens in rock crevices and hollow logs.	Small mammals, birds, carrion	Some populations have been considerably reduced in recent years; probably few (if any) in Boise River below Lucky Peak Dam.
		BIRDS		
Ferruginous hawk	Sen, Sp Con, PT, BL	Arid sagebrush lands; grasslands, rangelands, open country; nests built of sticks (primarily big sagebrush) in cliffs, in trees, or on the ground; readily deserts nests if disturbed.	Jackrabbits, cottontails, and rodents	Restricted to the sagebrush areas of the Snake River plains; populations limited; observed occasionally.
Southern bald eagle	E, Sen	Roost near rivers, reservoirs, and lakes providing sufficient food supply; also forages in adjacent sagebrush, grassland, and agriculture; scavenger and predator.	Fish, waterfowl, rabbits, rodents	Winter migrant; as many as 12 bald eagles have been observed wintering along lower Boise River; Barber Pool primary wintering area.
Osprey	Sen, PT, BL	Roost and forage near rivers, reservoirs and lakes.	Fish	Seasonal migrant in southern Idaho.
Prairie falcon	Sp Con, PT, BL	Tall sagebrush and shrublands in Ada County; plains, prairies, deserts; nests on cliffs.	Ground squirrels, other small mammals, birds	Snake River Birds of Prey Natural Areas has one of the world's largest nesting populations (i.e., 5 percent of world's total).
Peregrine falcon	E, Sp Con	Wide ranging; open country; nests on cliffs usually near marshes and streams providing adequate food.	Birds	Very uncommon seasonal migrant.
Columbian sharp-tailed grouse	Sen, Sp Con, PT, BL	Nonirrigated agriculture, grass-shrub habitat, prairie.	Seeds, buds, berries	Low populations in Ada County.
Bobwhite	Sp Con	Cottonwood-willow riparian; farmland; brush open country; roadsides.	Seeds of legumes, woody herbs, and cultivated grains, insects	Low, stable populations in restricted habitat; along Boise River downstream of Garden City.

Table 12-2. Cont'd.

Common Name	Status[2]	Habitat and Special Requirements[3]	Food Habits[3]	Distribution/Comments[3]
Mountain quail	Sen, Sp Con	Bitterbrush shrub steppe; brushy mountain and forest slopes.	Pine seeds, acorns berries	Low population north of Lucky Peak Reservoir; and Along Crane, Hulls, Warm Springs, and Maynard Creeks.
Northern long-billed curlew	Sen, PT, BL	Open short grass prairie; agriculture, rangelands, sagebrush and bitterbrush shrublands.	Insects	Nest north of Barber Pool.
Western burrowing owl	Sen, PT, BL	Grasslands, sagebrush, desert, farms; utilizes former rodent and badger burrows.	Small mammals, insects	Populations: low in winter-spring; medium in summer-fall.
		REPTILES		
Western ground snake	Sen, Sp Con	Annual grasslands; tall sagebrush; sand and subsurface moisture.	Spiders, centipedes, insects, insect larvae	Medium year-round population levels.
Desert night snake	Sp Con	Annual grasslands; tall sagebrush; deserts.	Frogs, lizards	Medium year-round population levels.

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[1] Species of Special Concern: Species whose population numbers are known to be of concern to governmental agencies or scientific, educational, or public interest groups.

[2] Status:

E - Endangered Species: designated endangered under the Federal Endangered Species Act of 1973 (as amended through December 28, 1979). "The term 'endangered species' means any species which is in danger of extinction throughout all or a significant portion of its range other than a species of the Class Insecta determined by the Secretary to constitute a pest whose protection under the provisions of this Act would present an overwhelming and overriding risk to man."

T - Threatened Species: designated threatened under the Federal Endangered Species Act of 1973 (as amended through December 28, 1979). "The term 'threatened species' means any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range."

Sen - Sensitive Species: Designated as sensitive in a Master Memorandum of Understanding between the Idaho Department of Fish and Game and the U. S. Bureau of Land Management (1977). Sensitive species are those lacking official listing and: ". . . [a] whose populations are consistently small and widely dispersed, or whose ranges are restricted to a few localities, such that any appreciable reduction in numbers, habitat availability, or habitat condition might lead toward extinction; and [b] whose numbers are declining so rapidly that official listing may become necessary as a conservation measure."

Sp Con - Species of Special Concern: Listed as a species of special concern in the fish and wildlife "Policy Plan" of the Idaho Department of Fish and Game (1978). "Species of special concern are those species whose restricted range, specific habitat requirements and/or low population numbers make them vulnerable to elimination from the state if adverse impacts on populations or habitat occur."

PT - Potentially Threatened: included in the original identification of potentially threatened wildlife, the "Red Book" (U. S. Fish and Wildlife Service 1973), but not now designated as endangered or threatened (U. S. Fish and Wildlife Service 1980); or listed as status-undetermined by Mehler (1974).

Table 12-2. Cont'd.

BL - Blue List: Included in the National Audubon Society "Blue List"; an "annual 'early warning list' of declining, threatened, or vulnerable [bird] species" (Arbib 1979). Only those species having some additional status designation are listed above.

[3] Habitat requirements, life history, distribution, and other information taken from: Burt and Grossenheider 1976; Idaho Department of Fish and Game 1977, 1978; Jensen 1980; Mohler 1974; National Fish and Wildlife Laboratory 1980; Peterson 1961; Snow 1972, 1973, 1974a, 1974b, 1974c; Stebbins 1966; U. S. Bureau of Land Management 1980; U. S. Fish and Wildlife Service 1973; Zarn 1974a, 1974b.

Bald Eagle. The southern bald eagle is designated "endangered" by the U. S. Fish and Wildlife Service. Historically and as late as the 1880s, bald eagles nested along the Boise River near Eagle, feeding on the large steelhead and salmon runs. Elimination of the fish runs by damming the river and the urbanization of the Boise area has restricted local bald eagle activity primarily to winter use of the Barber Pool (Figure 12-1) (Keating pers. comm.). One to five bald eagles make incidental use of the Boise River riparian habitats between Boise and Star (Howard pers. comm.).

Barber Pool is a large area of wooded riparian habitat, islands, and braided river channels behind Barber Dam. An abundant whitefish and salmonid fishery provides the primary prey for the eagles; waterfowl, jackrabbits, and various upland species comprise a smaller percentage of the prey. Jensen (1980) surveyed the Boise River between Mores Creek Bridge and Boise during the winter of 1979-1980. As many as 12 bald eagles were observed along the river, 7 in Barber Pool. Bald eagles occupied the area from late October to early April. Eagles roost in taller cottonwoods and on cliffs south of the river.

Northern Long-billed Curlew. The northern long-billed curlew is one of 14 bird species designated as "sensitive" under a memorandum of understanding between the Idaho Department of Fish and Game and the U. S. Bureau of Land Management (1977). The species has no official threatened or endangered status, but was listed by the U. S. Fish and Wildlife Service (1973) as a "status undetermined" species (i.e., possibly threatened with extinction, yet sufficient information to conclusively determine its status was lacking). Mohler (1974) also listed this species as status undetermined.

The long bill and long legs of the curlew adapt it to feeding on insects in short grass plains, rangelands, and agricultural fields. Nesting occurs in open prairie and is easily disturbed by human activity.

Curlews are largely spring and summer inhabitants of Ada County, usually leaving Idaho to migrate to the southwestern United States by August. Curlews nest in suitable upland habitat northeast of Barber Dam (Keating pers. comm.), and in central and northwestern Ada County (Ada Council of Governments 1973a) (Figure 12-1). The U. S. Bureau of Land Management recently conducted a study of long-billed curlews in Canyon County; analysis and publication of results have not been completed.

Recreational Species. A variety of recreational wildlife (i.e., game species) occur in Ada County. Ducks, ring-necked pheasant, mourning doves, chukar partridge, quail, and Hungarian partridge are the major birds harvested in the county; blue grouse, ruffed grouse, geese, and sage grouse are also taken. Elk, deer, and cottontails are the county's game mammals. Figures 12-2 through 12-6 illustrate the distribution of some of these species in Ada County.

Deer migrate to the lower foothills of the Boise Front or south of Lucky Peak Reservoir from higher elevations during winter when snow is deep or temperatures are severe. Deer formerly migrated onto the Snake River Plain as far downstream as Lake Lowell; urbanization has eliminated most such long migrations.

Breeding areas for waterfowl are limited in Ada County, although approximately 10,000 ducks are produced annually from breeding areas in Barber Pool, along the Boise River downstream of Garden City, along the Snake River, and at the county's smaller reservoirs.

Quail occur in the riparian and brushy habitats along several of the county's creeks and the Boise River. Chukar and Hungarian partridge inhabit arid brushlands and some agricultural fields. Blue grouse and ruffed grouse are restricted to the timbered areas of the Boise Front; sage grouse occur in sagebrush habitat south of Lucky Peak Reservoir.

Pheasant occur in most of the agricultural areas of the county. Pheasant are well adapted to farmland habitat, as long as sufficient cover exists along fencerows, between fields, and along roads. Consolidation of small farms into large farms, cultivation and mowing up to and directly adjacent to the fenceline, and modern sprinkler irrigation techniques reduce availability of suitable habitat to pheasants.

Mourning doves are widespread throughout most of Ada County. Farms, grassland, brushland, riparian areas, and woods all provide habitat for this species.

Impact Analysis

The projected direct and indirect impacts of the planned facilities are discussed below. Direct impacts are those resulting from facility construction or operation at the plant sites, along the pipeline routes, or at the sludge disposal sites. Indirect impacts are those resulting from growth and urbanization that would not have occurred without increased waste treatment capacity.

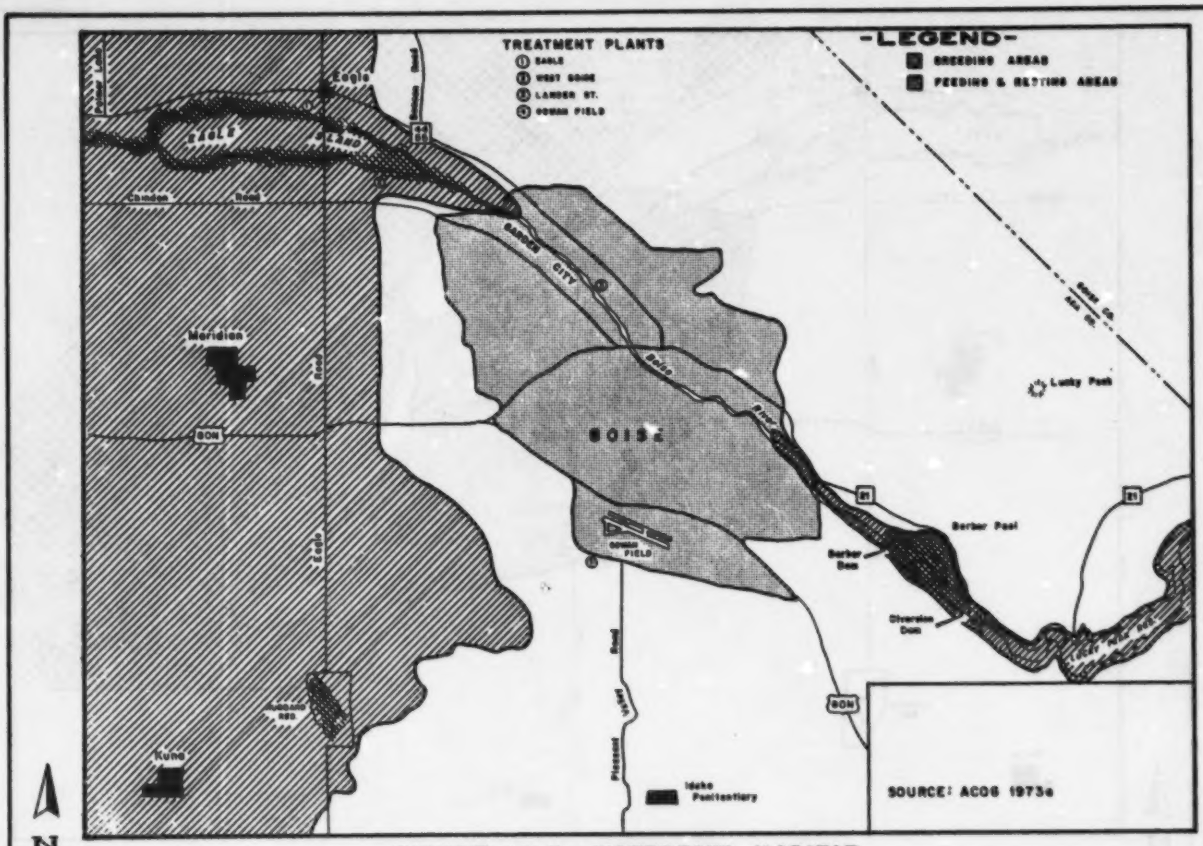

TREATMENT PLANTS
① EAGLE
② WEST BOISE
③ LANDER ST.
④ GOWAN FIELD
-LEGEND-
BREEDING AREAS
FEEDING & RESTING AREAS
Eagle
Eagle Island
Chinden Road
Garden City
Meridian
BOISE
Boise River
80N
Eagle Road
Gowan Field
Barber Pool
Barber Dam
Diversion Dam
Lucky Peak
Lucky Peak Res.
Kuna
Hubbard Res.
Pleasant Valley Road
Idaho Penitentiary
21
SOURCE: ACOG 1973a

FIGURE 12-3. WATERFOWL HABITAT

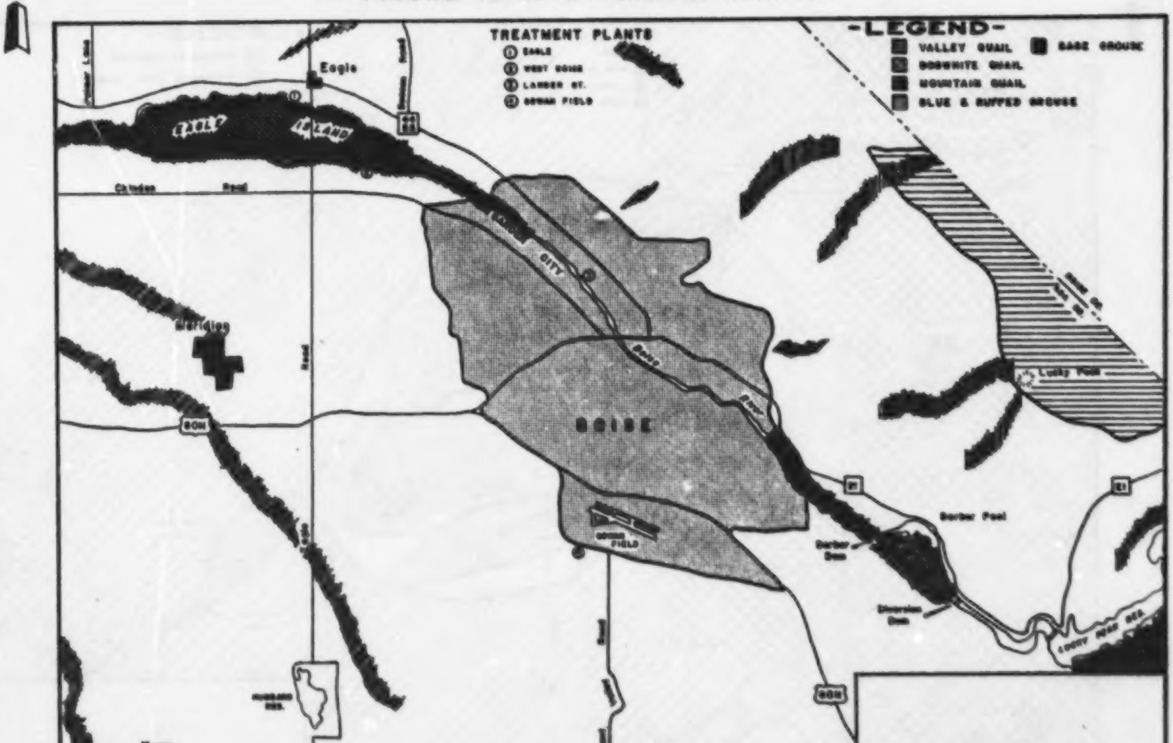

TREATMENT PLANTS
① EAGLE
② WEST BOISE
③ LANDER ST.
④ GOWAN FIELD
-LEGEND-
VALLEY QUAIL
SAGE GROUSE
BOBWHITE QUAIL
MOUNTAIN QUAIL
BLUE & RUFFED GROUSE
Eagle
Eagle Island
Chinden Road
Garden City
Meridian
BOISE
Boise River
80N
Gowan Field
Barber Pool
Barber Dam
Diversion Dam
Lucky Peak
Lucky Peak Res.
Kuna
Hubbard Res.
Pleasant Valley Road
Idaho Penitentiary
21
SOURCE: ACOG 1973a

FIGURE 12-4. QUAIL AND GROUSE HABITAT

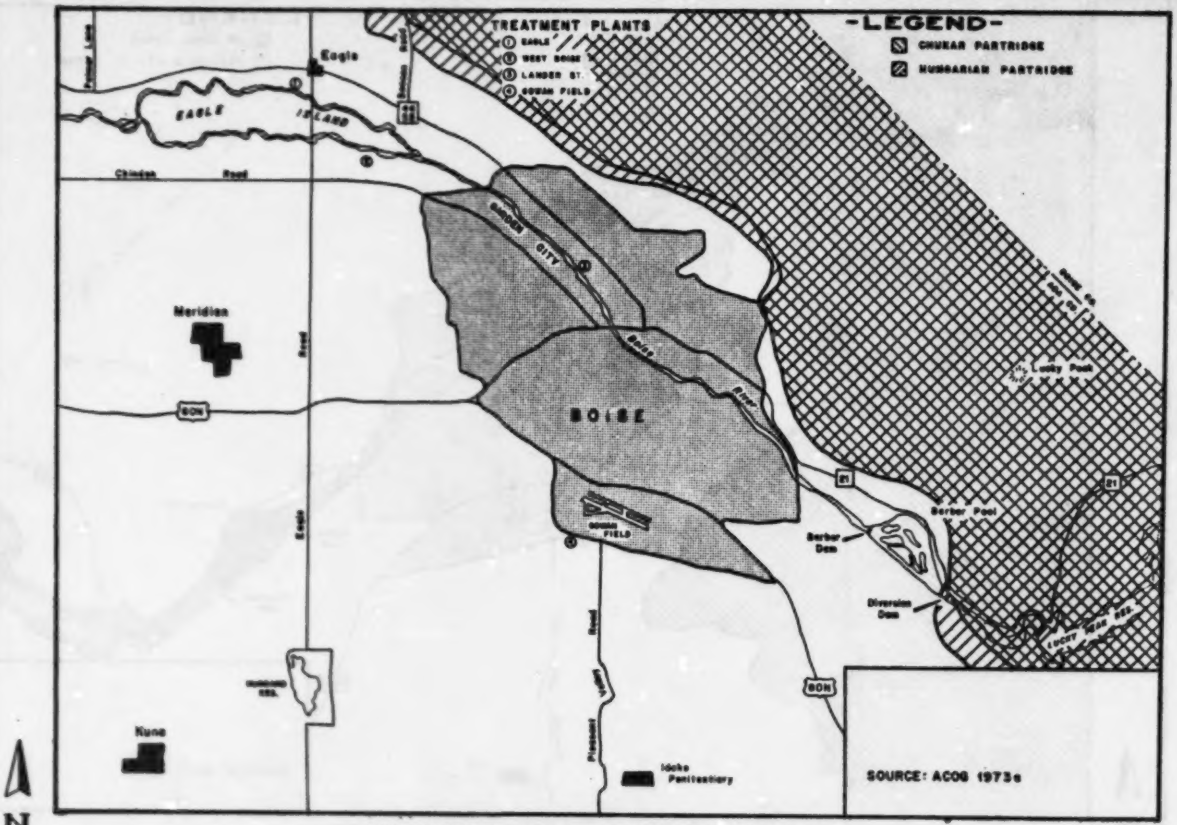

TREATMENT PLANTS
① EAGLE
② WEST BOISE
③ LANDER ST.
④ GOWAN FIELD
-LEGEND-
▧ CHUKAR PARTRIDGE
▨ HUNGARIAN PARTRIDGE
Eagle
EAGLE ISLAND
Chinden Road
Meridian
GARDEN CITY
Boise River
BOISE
GOWAN FIELD
Barber Pool
Barber Dam
Diversion Dam
LUCKY PEAK RES.
Lucky Peak
BOISE CO.
ADA CO.
Eagle Road
Pleasant Valley Road
Kuna
Idaho Penitentiary
80N
21
N
SOURCE: ACOG 1973e

FIGURE 12-5. PARTRIDGE HABITAT

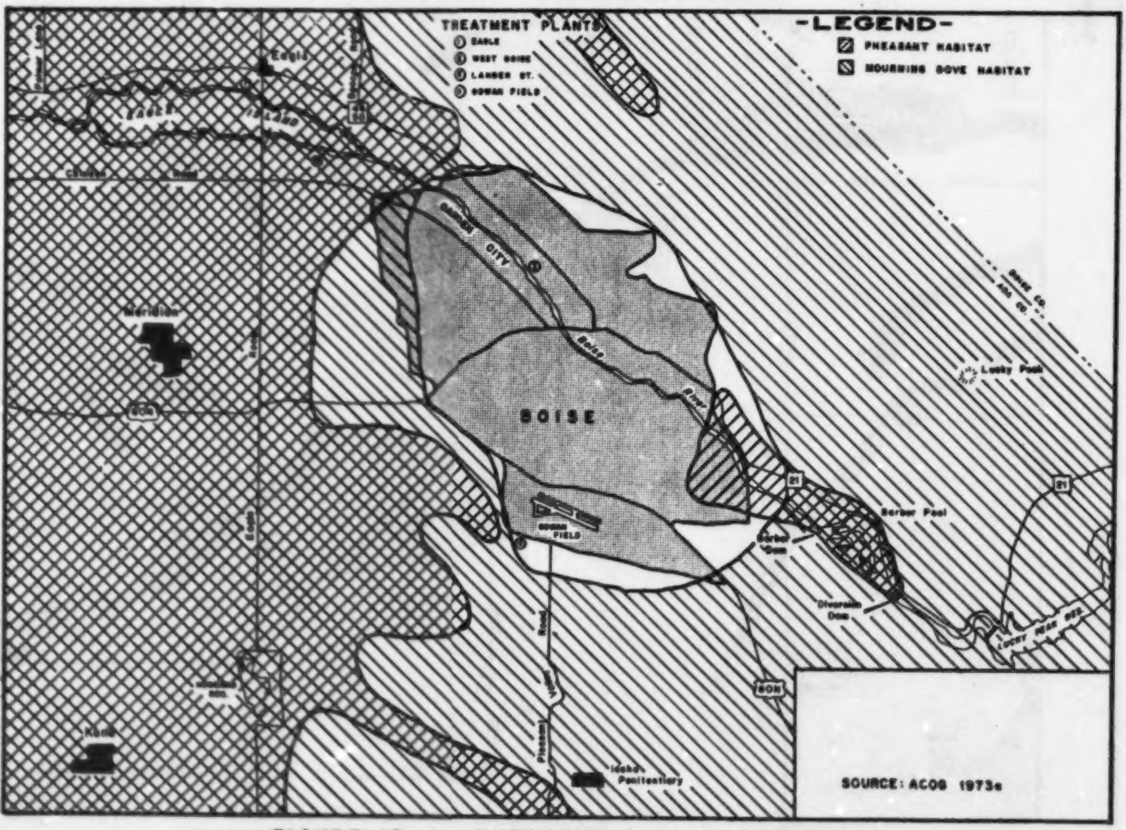

TREATMENT PLANTS
① EAGLE
② WEST BOISE
③ LANDER ST.
④ GOWAN FIELD
-LEGEND-
▨ PHEASANT HABITAT
▧ MOURNING DOVE HABITAT
Eagle
EAGLE ISLAND
Meridian
GARDEN CITY
Boise River
BOISE
GOWAN FIELD
Barber Pool
Barber Dam
Diversion Dam
LUCKY PEAK RES.
Lucky Peak
BOISE CO.
ADA CO.
Kuna
Idaho Penitentiary
80N
21
SOURCE: ACOG 1973e

FIGURE 12-6. PHEASANT & DOVE HABITAT

Direct Impacts

Lander Street and West Boise. Expansion of the capacity of the Lander Street and West Boise facilities will have few direct impacts at the plant sites. Biotic communities of the sites are currently highly disturbed. Most construction will occur within the existing plant sites in areas formerly used for waste treatment or in landscaped areas. Disturbance of local wildlife during construction should be minor and temporary. Disturbance caused by operation of the expanded plant should not be significant.

Construction of the sludge pipeline will impact plant communities slightly along the route, including riparian habitat where the pipeline crosses the river. The vegetation should recover following construction if no right-of-way maintenance program is instituted.

Sludge disposal at the penitentiary should have little or no effect on wildlife. If additional acreage is brought under cultivation as part of the project, some of the native species supported on the presently uncultivated land will be lost. The cultivated fields, however, will provide forage for agriculture-tolerant species.

Eagle. Construction of the new Eagle treatment facilities will eliminate about 15 acres of riparian habitat along the Boise River. The riparian habitat will be replaced by aerated lagoons, an equalization basin, several small structures, and dikes. The connecting pipeline between the new and old facilities will lie almost totally outside riparian vegetation.

The proposed plant site is located in a flood hazard zone and is in one of the larger riparian communities along the river. Because of its size and configuration (extending over 100 yards inland from the edge of the river), this riparian community provides excellent habitat for deer, raccoons, yellow-headed blackbirds, kingfishers, great blue herons, and many other species. Riparian areas that are only a line of trees or a narrow band of vegetation along the streamcourse do not support the great wildlife diversity that such a large, deep parcel is able to support. The riparian habitat at the Eagle site is of even greater importance because it is one of only three large riparian areas in the reach of the river from Boise to Eagle (the other two are: 1) downstream of the Strawberry Glen Airport, and 2) at Barber Pool).

Loss of the riparian habitat will reduce the wildlife populations inhabiting the site. Water-associated birds and mammals will be detrimentally affected. Available roosting sites for raptors, including possibly an occasional bald eagle, will be reduced.

Executive Order 11990, Protection of Wetlands, "requires Federal agencies conducting certain activities to avoid, to the extent possible, the adverse impacts associated with the destruction or loss of wetlands and to avoid support of new construction in wetlands if a practicable alternative exists" (40 CFR 6.302). As defined in this policy, "wetlands" includes marshes, sloughs, river overflows, and similar areas.

In response to Executive Order 11990, and in consultation with the U. S. Fish and Wildlife Service, EPA performed a wetlands assessment of the Eagle site. The U. S. Fish and Wildlife Service concluded that the site is not a natural wetland (see Chapter 15, responses to comments).

Although construction of the Eagle facilities will cause a direct loss of appproximately 15 acres of riparian habitat, the remaining riparian habitat on the 65-acre, district-owned site (if maintained in its present condition) may persist longer than if the site had remained in private ownership. Many acres of privately-owned riparian habitat have been converted to urban and agricultural use in the past.

Specific plans have not been developed for the old treatment plant site once the new plant is completed. The facilities plan (J-U-B Engineers 1980) states that a possible use could be park development. Loss of the open water habitat provided by the old ponds will not be significant; the new ponds and adjacent river will provide similar habitat. Development of riparian habitat at the site could enhance its wildlife value.

The pipeline from the ponds to the rapid infiltration site is expected to run along existing rights-of-way. Such areas are already highly disturbed, and construction impacts on wildlife should be negligible.

The rapid infiltration site is currently under cultivation and is immediately adjacent to a heavily stocked feedyard that is completely lacking in vegetative cover. A wooded canal that will carry infiltration effluent runs along the south side of the site. No impacts are expected at the site with the possible exception of some disturbance in the canal when drainage pipes are being installed.

Southwest Area. Because the "rural lifestyle" land use plan (APA 1980) for this area is currently the most likely to be implemented, no direct impacts are foreseen.

Indirect Impacts

Boise and Eagle. The major impacts of expansion of the Boise and Eagle facilities will result from accommodating urban growth. The habitats primarily impacted will be the agricultural lands and the arid brushland-grasslands in the foothills of the Boise Front and on the Snake River.

Many or all of the local populations of the two candidate threatened or endangered plant species could be lost to urbanization if no provisions are made for protecting the population. Developments impacting these endangered plants may be proposed and approved without the facilities expansion.

Loss of the farmlands, brushlands, and grasslands will reduce the populations of the species (e.g., pheasants and mourning doves) inhabiting those areas. Foraging habitat for raptors such as kestrels and marsh hawks will be reduced.

As urban areas extend into the foothills, deer winter ranges will be detrimentally affected. Although most of the crucial wintering areas of the Boise Front are in public ownership (Parker pers. comm.), some important areas will be lost, and the incremental losses of wintering areas of lesser importance will continue. Increased recreation, especially off-road vehicles and snowmobiles, will also degrade the wildlife habitats along the Boise Front.

Urban growth will likely impact the feeding or nesting areas of the long-billed curlew, through both direct habitat loss and disturbance by increased human activity in adjacent areas. Urbanization near Barber Pool will increase disturbance and decrease secondary foraging habitat for bald eagles. Higher local human populations will increase use of the Barber Pool area for recreation. The majority of recreation use, however, should occur in summer when eagles are absent. Bald eagles are considered vulnerable to human disturbance; the precise level of nearby human activity that bald eagles will tolerate, however, is unknown.

Southwest Area. The loss of agricultural and brushland-grassland habitat to high density urban development will be avoided by implementing the "rural lifestyle" alternative. Urban growth will occur on larger lots suitable for septic tank systems, however, taking some farmland out of production, replacing existing vegetation with landscaping plants, and increasing human activity. Pheasants and other farmland wildlife will be detrimentally impacted, and raptor foraging habitat will be reduced. These impacts will be less severe than would be projected for higher density development.

Impact Summary

Few direct wildlife impacts will result from the proposed projects. A major direct detrimental impact will be the loss of a large area of Boise River riparian habitat at the proposed Eagle plant site. Accommodated urban grwoth will cause the greatest long-term impacts on wildlife. Conversion of open spaces in the foothills and on the plain to housing and industry will reduce the available habitat for many species. The bald eagle and long-billed curlew are especially vulnerable to disturbance.

EPA has concluded that no practical alternative site exists for construction of the Eagle facilities. A major factor in the acceptance of this site is the determination by the U. S. Fish and Wildlife Service that the proposed site is not a natural wetland. However, EPA recommends that the Eagle Sewer District make every effort to minimize impacts to the riparian habitat at the site. EPA has requested that the ESD consult with the Idaho Department of Fish and Game and the U. S. Fish and Wildlife Service during the pre-design phase to ensure that mitigation measures deemed necessary by these agencies are incorporated into the design.

A variety of mitigation measures may be incorporated into the facilities design. Potential mitigation measures include:

- Retention of a 100-foot-wide buffer strip of riparian vegetation between the river and the facility.
- Dedication of the remaining riparian habitat within the district-owned parcel to wildlife, and maintaining the riparian vegetation.

Urbanization and recreation within or adjacent to Barber Pool should be planned to minimize bald eagle disturbance. Development, for example, should be discouraged near the cliffs used as roosting sites, and winter recreation should be directed toward the periphery of the pool, rather than through the middle of it. Similarly, development should be directed away from curlew nesting areas. Indirect impacts can be reduced through local development impact review. Local land use plans and ordinances currently indicate concern for wildlife resources and provide for mitigation of development impacts.

Chapter 13

ARCHEOLOGICAL AND CULTURAL RESOURCES

Introduction

Section 106 of the National Historic Preservation Act requires the head of any federal agency with jurisdiction over a proposed federal or federally-assisted project to consider the impact of the project on sites, districts or structures included on, or eligible for inclusion on, the National Register of Historic Places prior to taking action on the project. The federal agency must also provide the Advisory Council on Historic Preservation the opportunity to review the cultural and historic implications of the proposed project prior to action.

Regulations implementing Section 106 identify the procedure for evaluating potential impacts on properties on or eligible for the National Register. This includes: 1) identifying properties within the project's area of impact that are on or eligible for inclusion on the National Register of Historic Places (this includes consulting the National Register and the State Historic Preservation Officer [SHPO]); 2) determining whether properties on or eligible for the National Register might be affected by the project; 3) determining if the effect is adverse; 4) notifying the Advisory Council and the SHPO of the findings of the impact analysis; and 5) proceeding with the consultation process if an adverse effect is anticipated.

The annual listings of historic properties appearing in the March 18, 1980 Federal Register and monthly supplements have been reviewed and the Idaho State Historic Preservation Officer (SHPO) has been contacted with respect to possible historic and cultural resources which may be affected by the wastewater treatment facilities proposed for the Eagle Sewer District (ESD) and the City of Boise.

Impacts

As a result of consultation with the Idaho SHPO and review of the annual listings of historic properties, EPA has determined that none of the alternatives evaluated for providing wastewater facilities for the ESD and the City of Boise will affect any historic properties included in the National Register of Historic Places. In addition, it has been determined that there are no properties within the area of environmental impact that will be affected which are eligible for inclusion in the National Register.

In further consultation with the Idaho SHPO, the state archeologist has determined that there are no cultural resources located within the ESD project area. This determination is based on an archeological field reconnaissance of the proposed construction site.

The proposed City of Boise wastewater treatment facilities have also been reviewed by the state archeological officer. The primary area of concern appears to be along the Boise River. Of the numerous archeological surveys conducted along the river, the only site found to date is a large trash deposit located in the Julia Davis and Ann Morrison Parks. Proposed interceptor alternative alignments will, however, run near the river; therefore, the state archeologist would like to periodically inspect the open trenches and dirt removed from them to record buried archeological sites and recover any artifacts found (see letters at end of this chapter).

Based on this request, EPA will require the City of Boise to provide access to Idaho SHPO representatives for inspection of trenches and excavated materials. This requirement will be included in a Step III (construction) grant condition. The state archeologist has concluded the proposed sludge pipeline will have no effect on any sites.

If any changes in proposed construction location associated with the proposed Eagle or Boise facilities should occur, the state archeologist will be notified and appropriate action taken to comply with Section 106.

January 21, 1981

COPY

Reproduced from
best available copy.

Mr. M. Wayne Gibbs
Project Planner
J-U-B Engineers, Inc.
250 S. Beechwood Avenue, Suite 1
Boise, Idaho 83705

Re: Eagle Water and Sewer District

Dear Mr. Gibbs:

An archaeological field reconnaissance of the proposed construction site in the Eagle Water and Sewer District has been conducted. Since no cultural resources were found, this project should have no effect on any archaeological or historic sites. However, should there be any changes in the proposed construction location please consult with us further. Thank you for your cooperation.

Sincerely,

Thomas J. Green
State Archaeologist
State Historic Preservation Office

cc: Hal Bissell, Jones and Stokes Associates

COPY

December 22, 1980

Ms. Margaret L. Zimmerman
CH2M Hill
700 Clearwater Lane
Box 8748
Boise, Idaho 83707

Dear Ms. Zimmerman:

We have finally reviewed the maps you sent for the Boise Wastewater Facilities Plan. Our only area of concern is along the Boise River. We have conducted numerous archaeological surveys along the river and have yet to find any sites other than the large historic trash deposits in Julia Davis and Ann Morrison parks.

The sludge pipelines will have no effect on any archaeological or historic sites.

For the interceptors running near the river we do want to periodically inspect the open trenches and the dirt removed from them to record buried archaeological sites and recover any artifacts uncovered. No arbhaeological excavation or slow downs of the construction will be needed.

Sincerely,

Thomas J. Green

Thomas J. Green
State Archaeologist
State Historic Preservation Office

Chapter 14

SUMMARY OF SIGNIFICANT PROJECT RELATED IMPACTS

In this chapter the alternatives proposed for the City of Boise and the Eagle Sewer District (ESD) wastewater treatment projects are reviewed and the significant impacts of each are briefly discussed and summarized under a number of environmentally important headings.

Wastewater Treatment and Disposal Impacts

Boise River

Impacts. There should be no significant adverse impacts resulting to the Boise River from the proposed wastewater treatment plant at the Cities of Boise and Eagle, provided that the 1-in-10 year low flows used in the Boise facilities designs are actually implemented.

Residual chlorine levels in the Boise River will be decreased due to installation of dechlorination. Increased nutrient loadings to the Boise River may cause greater algal growth levels and greater dissolved oxygen sags in the lower river. The quantitative extent of the impact is not known.

Mitigation. The 1-in-10 year low flow used in designing facilities expansion needs to be assured in order that the receiving water quality criteria can be met.

Growth-Related Impacts

The proposed projects will provide capacity to accommodate growth. This growth will cause indirect impacts upon a number of environmental features. These impacts have been described in previous chapters and are summarized under the following environmental topic headings where relevant.

Air Quality

Impacts. Vehicle emissions from traffic associated with growth accommodated by the proposed projects will partially offset emission reductions which would otherwise occur (due to current vehicle emission control programs). Violations of the federal carbon monoxide (CO) standard are expected to continue beyond the year 2000 unless additional air quality improvement measures are taken. Projected 1987 CO emissions from motor vehicles must be reduced by as much as 53 percent to achieve air quality standards throughout the Boise area,

Mitigation. The APA is currently reviewing a number of measures which could be implemented to help achieve air quality standards throughout Ada County. These measures include:

- Implementation of a county-wide vehicle inspection and maintenance program with special consideration given to "cold start" emissions.
- Improved public transit (short-term and long-term programs).
- Carpool/vanpool programs.
- Park and ride facilities.
- Traffic flow improvements through signalization programs, intersection design changes, added road lanes; many specific roadway and intersection improvements are already accounted for in the emission forecasts (see Appendix A).
- Exclusive bus and carpool lanes.
- Parking management programs (controls on the location and duration of on- and off-street parking; parking costs; supporting park and ride programs; facility design and operation; etc.).
- Controls on extended vehicle idling at drive-in facilities.
- Pedestrian malls.
- Improved bicycle facilities.
- Employer actions to support transit, carpool/vanpool programs, bicycle usage, flexible work schedules, etc.

These measures will require further study to determine the effectiveness of each measure to aid in the achievement of air quality maintenance standards.

Conversion of Agricultural Land to Urban Uses

Impacts. Future development in the Boise, Eagle, and Southwest areas will occur largely on lands identified by the Soil Conservation Service as "prime farmlands". Most of these areas have been shown for future urban development on local comprehensive plans, and currently have minimal crop production.

Public Services and Facilities

Impacts. The adverse impacts on public services from growth accommodated by wastewater facilities will be most significant in areas where the existing level of public service is currently deficient. In the Boise metropolitan area, the outlying areas are presently experiencing some public service deficiencies, primarily in police and fire protection and schools. In the Eagle area, adverse impacts on most public services will result as growth extends beyond the central city planning area. Additional medical care and hospital facilities will be required.

Mitigation. Existing Ada County and Boise policies should be implemented to avoid further compounding existing public service deficiencies. These policies encourage concentrating future development in areas already provided with public services, or in areas contiguous to serviced developments.

Urban service policies are implemented in part by designation of urban service planning areas in Ada County. Most residential, commercial, and industrial development is encouraged by the Ada County Comprehensive Plan to occur in urban service planning areas.

The policy plan for the Boise Metropolitan Area also uses the urban service planning area as a mechanism to coordinate growth and the provision of urban services.

Vegetation, Wildlife and Fisheries

Impacts. Accommodated urban growth will cause variable long-term impacts on wildlife. Conversion of open spaces in the foothills and on the plain to housing and industry will reduce the available habitat for many species. The bald eagle and long-billed curlew are especially vulnerable to disturbance.

Indirect impacts due to population growth will consist of increased sediment load, and higher flood peak flows from urbanized tributaries. Increased sedimentation of stream gravels will lower habitat quality conditions for trout and whitefish in the Boise River.

Mitigation.

Vegetation and Wildlife. Urbanization and recreation within or adjacent to Barber Pool should be planned to minimize bald eagle disturbance. Development, for example, should be discouraged near the cliffs used as roosting sites, and winter recreation should be directed toward the periphery of the pool, rather than through the middle of it. Similarly, development should be directed away from curlew nesting areas.

Fisheries. Implement drainage and runoff control measures to prevent sediments from growth-related development entering the streams and rivers.

Drainage

Impacts. Existing problems of inadequate or poorly maintained drainage facilities are likely to persist. These problems include potential flooding and property damage from inadequate storm drainage systems, overloading of irrigation canals in some areas, and nuisance conditions at poorly maintained detention ponds.

Mitigation.

- Designate an agency to implement countywide drainage planning, facility implementation, maintenance and administration.
- Seek legislative clarification to provide full drainage authority and funding.
- Develop, adopt and implement consistent drainage criteria for storm drain design and flow routes from 100-year flood runoff.
- Prepare, adopt and implement drainage master plan, specifying facilities or concepts, and providing for funding and a consistent approach to storm drain authorization with irrigation facilities.

Resource and Energy Use

Impacts. Population increases in the sewered area will use energy in the residential and transportation sectors and could stimulate consumption in the commercial and industrial sectors. The principal energy sources are natural gas, electricity, and petroleum fuels. Some geothermal energy is used for space heating in Boise, and many residences use wood as fuel.

Future trends in the availability and consumption of energy resources are difficult to predict. The local availability of energy will be closely related to regional and global trends in energy sources and supplies.

Mitigation. Institute energy conservation measures.

Traffic Congestion

Impacts. Population growth supported by increased wastewater treatment plant capacity will add traffic loads to the existing roadway system of the area. Roadway elements which currently experience significant congestion may be further impacted by additional development.

Mitigation. Develop local traffic plan considering air quality attainment standards.

Water Resources

Impacts. As additional agricultural lands in the Boise Valley are converted to nonagricultural uses the balance between nitrogen and salts loadings and the volume of water recharged to the aquifers will be adversely affected.

Under land use Plan C, rural lifestyle, it is expected that the Southwest Boise area will retain its rural characteristics for the foreseeable future. It is improbable that the anticipated growth will cause a major change in groundwater quality and quantity. However, further data are needed to ensure protection of public health and safety as growth occurs.

Mitigation. Regular monitoring of shallow and deep groundwater quality, preferably on a seasonal basis, should be carried out by an appropriate government agency to provide needed data for future planning and decision-making purposes. The Southwest Community Wastewater Management Plan (APA 1981) identifies programs and recommendations which will further protect groundwater supplies in rural areas.

Public Health. There should be no significant impact upon groundwater or public health as a result of liquid sludge disposal as proposed and described in the Boise wastewater treatment facilities plan.

Construction-Related Impacts

There are many construction-related impacts which will be common to all the alternatives at both Boise and Eagle. These impacts relate to the general use of equipment and are chiefly in the categories of noise, dust, sedimentation, and traffic. Impacts may also include physical displacement or destruction of resources such as vegetation and wildlife.

The proposed projects involve modification or construction of facilities at several different locations in the Boise and Eagle area. The significance of construction-related impacts usually depends on site-specific conditions. Thus, the following discussions are organized in terms of project elements at different locations.

Noise, Dust and Erosion

Impacts. Figure 14-1 identifies noise levels by types of equipment which are typically used for construction and demolition. Most of this equipment will be necessary for implementation of the primary treatment improvements and pipeline construction. In addition to equipment used within the primary plant sites, vehicles related to construction operations will be entering and leaving the sites. Construction-related vehicles will include passenger vehicles for workers, materials transport trucks, and waste removal vehicles.

Plant site grading and excavation of facility sites and pipelines, demolition of abandoned facilities, vehicle movements on unpaved roads and parking areas, and handling of debris from construction or demolition will produce dust and expose soil surfaces to erosion. Dust generated by construction activities will undoubtedly be carried off-site on occasion.

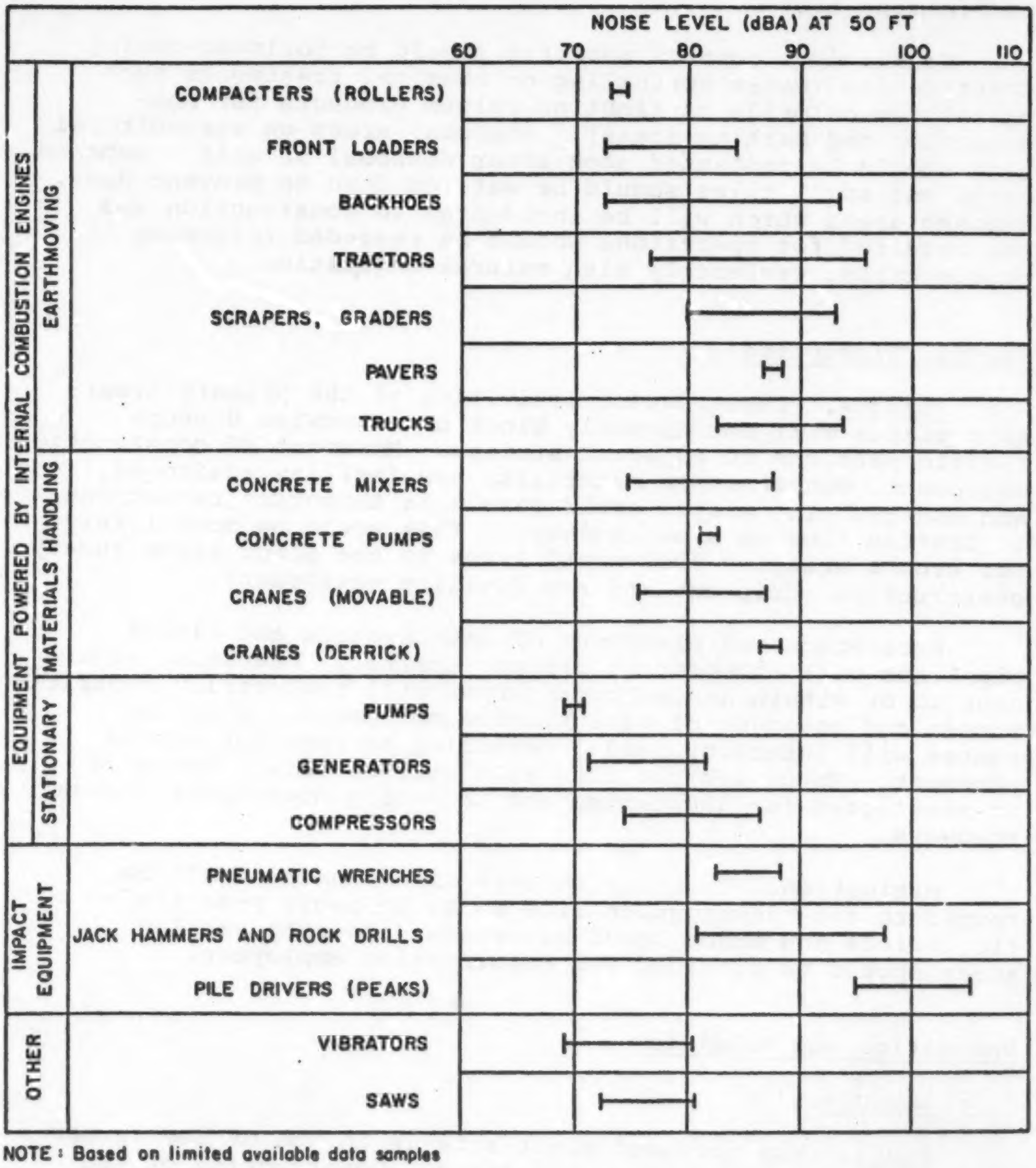
South Boise Interceptors. Short-term adverse impacts upon recreational, green belt, and park areas will occur from the river north route, and upon a recreational area from the river west route. Short-term adverse impacts will result to residences along the Adams Street route, and to a recreational vehicle park near the river east and inland east routes.

North Boise Interceptors. Short-term adverse impacts will result to approximately the same extent from all four proposed North Boise interceptor routes.

Eagle. No significant adverse impacts will result from the proposed treatment plant facilities and interceptor.

Figure 14-1

NOISE FROM CONSTRUCTION EQUIPMENT



NOTE: Based on limited available data samples

SOURCE: U. S. Environmental Protection Agency, 1971b.

Mitigation. Noise can be minimized by requiring that all internal combustion engines be equipped with mufflers and baffles and be properly maintained. Construction operations should be limited to normal daylight working hours. Vehicles should carry full loads of materials and passengers to minimize trips.

Normal dust control measures should be followed during construction (water sprinkling or chemical treatments such as calcium chloride or light petroleum products for construction and parking areas). Disposal areas on agricultural land should be replanted soon after disposal of soil. Exposed areas and spoil piles should be watered down to prevent dust. Exposed areas which will be incidental to construction and not required for operations should be reseeded following construction, preferably with natural vegetation.

Traffic Disruption

Impacts. Construction activities at the primary treatment plants will not directly block or otherwise disrupt traffic patterns on adjacent streets. Movement of construction equipment, construction materials, new facility equipment, and construction wastes could result in temporary reductions in traffic flow on area roadways. This would be most likely for trucks bringing over-sized loads to the plant sites (heavy construction equipment and new facility equipment).

Excavation and placement of interceptors and sludge pipelines will temporarily disrupt traffic. Trenching adjacent to or within agricultural areas will temporarily restrict access and movement of agricultural equipment. Pipeline routes will intersect roads, requiring an open cut across pavement. Motor vehicle flow will be temporarily detoured or restricted for jackhammer and trenching operations across roadways.

Mitigation. Trucks with over-sized loads should be routed to the construction site so as to avoid peak traffic periods and major local arterials. On-site parking areas should be provided for construction employees.

Vegetation and Wildlife

Impacts.

Eagle. The proposed plant site is in one of the larger riparian communities along the river. Construction of the proposed Eagle facilities treatment ponds will eliminate a minimum of 15 acres of riparian habitat along the Boise River. Loss of the riparian habitat will reduce the wildlife population inhabiting the site, especially water-associated birds and mammals.

Boise. Riparian habitat will be destroyed by certain of the proposed interceptor and sludge line routes which may be located near the river. The river west route for the South Boise Interceptor would destroy more than 5 acres of riparian vegetation in a narrow strip along the river if located near the bank.

The proposed North Boise interceptor routes would have significant impact only where Main A would cross Eagle Island and the river, and where Main E crosses the river. There would be fewer impacts from the other routes which generally are located on irrigated farmlands.

The greatest impact would probably be the crossing of Eagle Island which would disrupt vegetation and may disturb an active great blue heron rookery. Impact would be greatest during the heron and waterfowl nesting season (February through June).

Construction could conflict with bird hunting seasons in the fall.

The destruction of riparian habitat may generally be regarded as a potentially significant short-term impact. Vegetation will be lost, and associated animal life will be lost or disturbed.

The long-term impacts will not be significant if vegetation is reestablished.

However, if any of the corridor routes are used for other land uses, such as bikeways, then there would be a significant long-term adverse impact upon the wildlife due to elimination of habitat and to disturbance by humans.

Mitigation. EPA recommends that both the Eagle Sewer District and the City of Boise consult with the Idaho Department of Fish and Game and the U. S. Fish and Wildlife Service during pre-design of the proposed projects. Impacts to the riparian habitat that will result from construction of the Eagle sewage treatment plant and the probable location of interceptor and sludge line routes for the Boise facilities should be mitigated to the maximum extent possible. Consultation with state and federal agencies will ensure that specific mitigation measures deemed necessary by these agencies are incorporated into the design.

Interceptor and sludge lines proposed for Boise should be located to avoid riparian habitat where feasible and the vegetation within the corridors should be restored.

Other land uses should not be established in areas where significant wildlife use exists, such as the great blue heron rookeries.

Fisheries

Impacts. There is some potential for fisheries impacts resulting from river crossings by interceptors and sludge pipelines. All of the Boise interceptor and sludge pipeline alternatives would require at least one river crossing. River crossings will result in temporary adverse effects on aquatic biota. Fall spawning runs of anadromous fish species may also be affected. Species will be displaced from the area of equipment operations, and sedentary species or fish eggs could be destroyed. Sedimentation from excavation and river bottom disturbance will affect fish, causing avoidance of silted waters and possible gill irritation. Insects which serve as food for fish will also be affected. Siltation will also cause smothering of fish eggs in downstream areas.

These adverse impacts are not expected to be significant if stream crossings are conducted as advised by the Idaho Department of Fish and Game and the U. S. Army Corps of Engineers. All stream crossings will require appropriate permits from the Idaho Department of Fish and Game and the U. S. Army Corps of Engineers.

Mitigation. Specific mitigation measures should be developed in consultation with the Idaho Department of Fish and Game and the U. S. Army Corps of Engineers. The Corps has issued a Nationwide General Permit for the placing of dredged or fill material for backfill or bedding of utility line crossings provided the following conditions are satisfied:

"a. The watercourse is returned to preconstruction bottom contours and all excess material is removed to an upland disposal area.

b. That the discharge will not be located in the proximity of a public water supply intake.

c. That the discharge will not occur in areas of concentrated shellfish production.

d. That the discharge will not destroy a threatened or endangered species as identified under the Endangered Species Act, or endanger the critical habitat of such species.

e. That the discharge will not disrupt the movement of those species of aquatic life indigenous to the water body.

f. That the discharge will consist of suitable material free from toxic pollutants in other than trace quantities.

g. That the discharge will not occur in a component of the National Wild and Scenic River System or in a component of a State Wild and Scenic River System.

The following management practices should be followed to the maximum extent practicable to minimize the adverse effects of the discharge on the aquatic environment:

a. Discharges in spawning areas during spawning seasons should be avoided.

b. Discharges in wetland areas should be avoided.

c. Heavy equipment working in wetlands should be placed on mats.

d. Discharges into breeding and nesting areas for migratory waterfowl should be avoided."

Archeological and Cultural Resources

Impacts. No cultural resources have been identified at the proposed Eagle treatment site or along the proposed Boise interceptor or sludge pipeline routes.

Historic trash deposits have been found at Julia Davis and Ann Morrison Parks but these parks will not be adversely impacted by the project.

Excavations for proposed treatment facilities or pipelines have the potential for disturbing previously unknown historical or archeological sites.

Mitigation. Excavation in areas designated by the state archeological officer as potential sources of archeological artifacts should be conducted according to advice from professional archeologists. The state archeologist should be kept informed of the progress of the proposed project, and the opportunity provided for professional examination of excavated sites and materials (see Chapter 13).

Disruption of Effluent Flow

Impact. Disposal of effluent during phases of new construction of pipelines and other facilities could be impaired.

Mitigation. Adverse impacts may be avoided by retaining existing pipelines, pumping stations, etc., until new facilities are put into operation.

New pump stations, for example, may be built separately and tied into existing pipelines during periods of low flow in the system. Temporary storage within the pipelines and emergency holding ponds may be used as needed while the new facilities are connected to the existing pipelines.

Resources and Materials

Impacts. All of the proposed alternatives will require the irretrievable expenditure of energy and materials in the construction and operation of the wastewater treatment facilities and the interceptor and sludge lines.

Mitigation. Recovery of methane gas from anaerobic digestion to aid in operating equipment in wastewater treatment facility.

Reduce infiltration/inflow in sewer lines, and establish water conservation program (reduce pumping loads).

No-Action Alternative

Boise

If the proposed wastewater treatment plans are not implemented, the present water quality problems would continue, and projected population growth would have no sewer service, leading to possible additional water quality problems. In turn this would lead to detrimental impacts upon fisheries and recreational uses of the Boise River.

Increased growth without sewering could result in increased waste discharge to septic tanks with significant threat of pollution to area waters. A building moratorium may result from this threat.

Boise residents may be required to pay fines and suffer the loss of federal funds for public projects if NPDES standards are not met.

Eagle

If no action is taken to implement the proposed wastewater treatment plan, conditions would remain as they are, resulting in continuing violation of the District's NPDES discharge permit, and with no provision for improvement in quality of effluent being pumped into the Boise River.

With no plan implementation there would be no new impacts at the proposed site. However, adverse impacts of the existing system would continue, including those related to water quality and community growth limitations. Any new growth would have to rely upon on-site waste disposal systems, which would increase risk of water pollution and which would require low density land use with possible adverse economic impacts upon the community, and indirect adverse impacts upon fish and wildlife habitat.

Chapter 15

RESPONSES TO COMMENTS ON THE DRAFT EIS

Introduction

Preparation of this EIS was initiated with three scoping meetings in Boise, Idaho (March 23, April 24, and May 9, 1979). These meetings were attended by a variety of local, state, and federal agencies. On June 7, 1979 EPA issued a Notice of Intent to prepare an EIS covering the wastewater management alternatives being considered by the City of Boise, ESD and APA.

Development of the Draft EIS proceeded concurrently with development of the various facility plans. During the initial 6 months of this work, the coordinator for the EIS preparation team was located in Boise.

Three public workshops were held in Boise on May 13 and 14, 1980. These workshops focused on air quality, groundwater, and surface water issues. The workshops were followed by an advertised public meeting on the evening of May 14, 1980. Publicity for this meeting included coverage in the local newspaper and distribution of 150 flyers to a variety of interested parties. The public did not respond to this publicity, and only personnel from various agencies concerned with the proposed projects appeared at the meeting.

The Draft EIS was released on March 16, 1981. A public hearing on the Draft EIS was advertised for the evening of April 30, 1981 in the Boise City Hall. Attendance at the public hearing was low, with comments and presentations made primarily by local agency staff. A transcript of the public hearing is available from the EPA, Region 10 office in Seattle, Washington.

Comments and Responses

Written comments received prior to, during, and after the public hearing are presented on the following pages. Responses to these comments are presented following each letter. Responses are keyed to comment numbers contained within each letter or shown in the margin of the letter.

MICHAEL D. GILTZOW
8889 MAPLEVIEW CIR
BOISE, IDAHO 83704

U.S. ENVIRONMENTAL PROTECTION AGENCY
422 W. WASHINGTON
BOISE, IDAHO

DEAR SIRS,

I REGRET THAT I AM UNABLE TO ATTEND THE WASTEWATER MANAGEMENET MEETING APRIL 30, 1981. I WOULD LIKE TO MAKE A NUMBER OF COMMENTS ON THE PROPOSED DEIS. I WILL BE AS BRIEF AS POSSIBLE. I HOPE YOU WILL CONSIDER MY COMMENTS BEFORE THE FINAL DRAFT COMES OUT.

I WILL CONFINE MY COMMENTS TO THE FOLLOWING FIVE SUBJECTS: (1) SEWER UPDATE PLANS (2) ONSITE COMMUNITY SEPTIC TANK & DRAINFEILDS (3) TOXIC WASTE DISCHARGE (4) SEWER ALTERNATIVES & (5) OIL & GREASE DRAINAGE.

1. SEWER UPDATE PLANS: IN READING THE UPDATE PLANS I FIND THAT I HAVE A FEW QUESTIONS CONCERNING THE FEASIBILITY OF THE PROJECTS FINANCIALLY. IN VIEW OF THE PRESENT ADMINISTRATION'S BUDGET CUTTING MOOD; WILL THERE REALLY BE FUNDS FOR THESE PROGRAMS IN THE FUTURE? IS IT REALISTIC TO SUPPOSE THAT FUNDING THROUGH 7 1/8% BONDS WILL BE POSSIBLE? IF THE FUNDS WILL NOT BE AVAILABLE , WHAT ALTERNATIVE FORMS OF SEWERING WILL BE IMPLEMENTED OR WHAT ALTERNATIVE FORMS OF FINANACING WILL BE TRIED?

2. ONSITE COMMUNITY SEPTIC TANK & DRAINFIELDS: THESE SYSTEMS HAVE BEEN TRIED IN SEVERAL LOCATIONS IN ADA COUNTY IN THE PAST. I SEE NO REAL PROBLEMS WITH THE COMMUNITY DRAINFIELDS AS LONG AS ADEQUATE ROOM IS RESERVED FOR A BACKUP DRAINFIELD. I DO SEE SOME PROBLEMS WITH THE LARGE COMMUNITY SEPTIC TANK. INITIAL COST IS VERY HIGH, MAINTENANCE COSTS ARE VERY HIGH AND SOLIDS ARE CONCENTRATED IN TOO SMALL A SPACE FOR ADEQUATE BIOLOGICAL BREAK DOWN. I INSPECT SEVERAL SEPTIC SYSTEMS IN THE BOISE AREA FOR THEIR OWNERS. ONE OF THESE SYSTEMS IS LOCATED AT FIVE MILE PLAZA AND CONSISTS OF SEVERAL SHOPS CONNECTED TO A 9000 GALLON SEPTIC TANK. EVERY TIME I HAVE INSPECTED THIS TANK IT HAS REQUIRED PUMPING. THERE IS A MASSIVE BUILD UP OF SLUDGE AND

SCUM NEAR THE INLET. THE SCUM IS SO THICK AT THE INLET THAT SLUDGE MEASUREMENT IS NOT POSSIBLE. THE TANK MUST BE PUMPED IN ORDER TO FUNCTION PROPERLY. YET THE REMAINDER OF THE TANK IS HARDLY USED AT ALL. THE SAME TYPE OF SOLID RETENTITON COULD BE ACCOMPLISHED WITH A 1000 GALLON SEPTIC TANK IN SERIES WITH SEVERAL OTHER TANKS. THE OTHER TANKS WOULD ACT AS SETTLING CHAMBERS MUCH AS THE REST OF THE 9000 GALLON TANK DOES. WITH THE ALTERNATE SYSTEM YOU WOULD HAVE TWO ADVANTAGES OVER THE LARGE SEPTIC TANK. ONE: INITIAL COST WOULD BE LOWER AND TWO: WHEN PUMPING IS NECCESSARY THE PUMPER WOULD PUMP A 1000 GALLON (OR 1500 GALLON) TANK INSTEAD OF A 9000 GALLON TANK WHICH WOULD BE A SAVINGS TO THE OWNER. IN SUBDIVISIONS WHERE A COMMUNITY SYSTEM IS USED I BELIEVE HAVING INDIVIDUAL SEPTIC TANKS HOOKED INTO A COMMON DRAINFIELD WOULD BE MORE EFFICIENT THAN ONE LARGE TANK BECAUSE THE SLUDGE AND SCUM WOULD BE LESS CONCENTRATED AND BREAKDOWN WOULD OCCUR MORE RAPIDLY. THUS PUMPING WOULD BE REQUIRED LESS OFTEN AND A REDUCED AMOUNT OF SLUDGE WOULD BE TRANSPORTED TO THE SEWER PLANT FOR PROCESSING.

3. TOXIC WASTE DISCHARGE: TWO PROBLEMS SHOULD BE CONSIDERED HERE. ONE: AS WE LEARNED SEVERAL YEARS AGO PUTTING OUR WASTE IN THE OCEAN DOES NOT ALWAYS MEAN WE HAVE SEEN THE LAST OF IT. I REFER TO THE MERCURY IN TUNA FISH PROBLEM. MY CONCERN IS THAT WE ROUTINELY DISPOSE OF HOUSEHOLD POISONS AND CHEMICALS WHICH EVENTUALLY END UP IN OUR OCEANS. DO WE KNOW THAT THESE CHEMICALS OR THEIR BREAK-DOWN PRODUCTS ARE SAFELY DIPOSED OF OR DO WE RUN THE POSSIBILITY OF FURTHER PROBLEMS LIKE THE MERCURY PROBLEM IN TUNA FISH? SECONDLY CAN WE PUT OUR EFFLUENT AND/OR SLUDGE ON AGRICULTURAL LANDS WITHOUT RUNNING THE SAME TYPE OF RISKS AS DUMPING IT IN OUR OCEANS?

4. SEWER ALTERNATIVES: I BELIEVE THAT ALTERNATIVES TO CONVENTIONAL GRAVITY SEWERS SHOULD AT LEAST BE MENTIONED IN THE WASTEWATER MANAGEMENT EIS. I AM SPECIFICALLY TALKING ABOUT PRESSURE SEWER SYSTEMS. I BELIEVE THAT THE MUNICIPALITIES SHOULD KNOW ABOUT ALTERNATIVES TO LARGE DIAMETER GRAVITY MAINS AND THE POSSIBLE COST SAVINGS THESE ALTERNATIVES COULD PROVIDE. I DON'T WISH TO IMPLY THAT PRESSURE SEWER SYSTEMS ARE A CURE FOR ALL OUR PROBLEMS OR THAT THEY COULD REPLACE ALL OUR PROJECTED GRAVITY SEWER SYSTEMS. BUT I DO BELIEVE THAT THEY ARE VIABLE ALTERNATIVES IN SOME DEVELOPEMENTS

AND THE PROPER OFFICIALS SHOULD KNOW OF THEIR ADVANTAGES FOR SOME PROJECTS. IN SOME CASES A PRESSURE SEWER SYSTEM CAN BE RUN TO AN EXISTING MIAN SEWER LINE AND DUMP EFFLUENT AND/OR SOLIDS INTO THE LINE. THUS SAVING THE COST OF A LARGE DIAMETER GRAVITY MAIN FROM THE DEVELOPEMENT TO THE MAIN LINE. OTHER ADVANTAGES ARE: WITH PRESSURE EFFLUENT SYSTEMS SOME PRETREATMENT OF OF SLUDGE IS DONE ON SITE AND THEREFORE HAS LESS IMPACT ON THE SIZE OF THE CENTRAL PLANT. ALSO WHEN SLUDGE IS TRUCKED IN TO THE PLANT A HOLDING TANK CAN BE USED AND THE SLUDGE CAN BE PROCESSED THROUGH THE PLANT AT A TIME WHEN THE TOTAL CAPICITY OF THE PLANT IS NOT BEING UTILIZED (SUCH AS AT NIGHT).

5.OIL & GREASE DRAINAGE: THE OIL ANDGREASE THAT DRAINS FROM OUR PARKING LOTS, ROADS, SERVICE STATIONS AND RESTAURANT IS NOT MENTIONED IN THE EIS AT ALL. IT IS A MAJOR PROBLEM. EVERY YEAR WE DUMP MORE GREASE AND OIL INTO OUR OCEANS FROM THE ABOVE SOURCES THAN ALL THE MAJOR OIL SPILLS EVER RECORDED. SOME WORK IS BEING DONE HERE IN ADA COUNTY BY REQUIRING GREASE AND SAND TRAPS TO BE INSTALLED IN PARKING LOTS, RESTAURANTS, SERVICE STATIONS ECT. BUT THAT IS THE END OF THE REQUIREMENT. WHEN THE TRAP FILLS UP IT PUSHES OILS AND GREASES INTO OUR DRAINAGE SYSTEMS AND OUT INTO OUR STREAMS, RIVERS, LAKES AND OCEANS. A MAINTENANCE SYSTEM FOR THESE TRAPS SHOULD BE STUDIED.

I THANK YOU FOR YOUR TIME AND CONSIERATION. I HOPE THAT MY COMMENTS WILL BE OF HELP TO YOU IN PREPARATION OF YOUR FINAL DRAFT.

SINCERLY YOURS,

Michael D. Giltzon

MICHAEL D. GILTZON

Response to Comments From Mr. Giltzow

1. These issues will be addressed during more detailed facility planning stages.

2. These issues should be considered by the Ada Planning Association and the Central District Health Department when implementing the recommendations contained in the Southwest Community Wastewater Management Plan (see Chapter 3 of this EIS.

3. There is always some element of risk associated with any method of waste disposal. Facility planning studies conducted to date have not identified any special concerns with either treated sewage effluent or digested sludge. Sludge applications at the prison farm site will involve areas used for fodder crops. A variety of monitoring and testing programs will be used to ensure that problems do not develop at this site. Sludge application rates will be based on a combination of factors, including heavy metal content of the sludge and relevant soil characteristics.

4. The use of pressure sewers was not addressed in the City of Boise or Eagle Sewer District facility plans.

5. This topic should be considered by the city and county agencies; the Ada Planning Association has primary responsibility for overall "nonpoint source" water quality management planning.

BOISE CITY PLANNING DEPARTMENT
150 NORTH CAPITOL BLVD.
2ND FLOOR

BOISE CITY, IDAHO

April 14, 1981

RECEIVED
APR 16 1981
ENVIRONMENTAL EVALUATION
BRANCH

Ms. Norma Young (M/S 443)
℅ U.S. Environmental Protection Agency
Region 10
1200 Sixth Avenue
Seattle, WA.

RE: Draft EIS "Wastewater Management for Boise, Eagle and Ada County, Idaho"

Dear Ms. Young:

It is a mark of civilized society when sanitary wastes are collected and carried away from human settlements. It is a superlative achievement when a society not only carries waste away, but also treats it, makes useful products of it, and protects the continued purity of earth and water.

1. The central questions of this EIS on wastewater management should be: "What will happen if wastes are collected and treated? What will happen if they are not?"

2. Believing this, I wish to challenge the logic (exemplified in your first paragraph on page 236 and your summary beginning on page XV) of identifying "growth" as an "area of impact". History is full of evidence that the presence or absence of advanced (or any) wastewater treatement neither directly or indirectly encourages or discourages growth in a community. Rather, growth is the result of economic forces primarily, with political and social forces contributing somewhat. It would be a delusion of grandeur for wastewater management analysts to believe that future population growth in Ada County is going to be accellerated or retarded merely because of the status of wastewater collection or treatment.

3. What will be affected, however, is the ability of the community to manage new population growth in a rational and flexible manner in which a whole series of goals can be achieved by the community. We wish to have clean water, make more efficient use of the land, protect the public health, provide an excellent transit service as an alternative to the auto, provide land use patterns which are convenient and satisfying for citizens, and provide an orderly system of public services at costs that taxpayers can recognize as reasonable.

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AN EQUAL OPPORTUNITY EMPLOYER

4. If new growth has to be served on septic tanks, for example, then we will very likely fail to attain any of the goals mentioned above. But there will be new growth.

5. The purpose of these remarks is really to suggest that the concept of "growth" as a result or impact of better wastewater management is an example of fuzzy thinking.

6. Because of the way in which this issue is presented and discussed in your report, it would appear logical to think: "Well, if the sewer system can handle it, the community will grow; if the community grows, a lot of bad things will happen; (loss of agricultural land, decreased air quality, loss of habitat, more flooding) and therefore, we better think twice about improving the sewer system."

7. I would rather have seen your matrix present the growth issue so that the logic would be more like this: "The community will grow; if it does, there will be a series of environmental protection problems for the community to have to deal with-either in new ways or in more intensive ways; if they intensify efforts in waste water management, they will be able to protect water quality of the Boise River, if they do not, water quality will be threatened. Growth will present other problems with respect to air quality, drainage, and habitat for wildlife. While wastewater management is the focus of the present EIS, we recommend continued efforts and attention be given to air quality, drainage, and the like".

8. The summary statement on page 83 presents a rather ominous tone and, as a conclusion, is also not very accurate. Boise City has enacted regulations for foothills development and drive-up businesses (air quality), regulates building structures in the floodplain, is working on a more comprehensive floodplain ordinance, has enacted energy conservation goals, and regulates development in the airport influence area. None of these things is at all "uncertain".

9. Development policies now governing city development are very likely to be adjusted and changed to accommodate new conditions of the 1980's. Our growth management policy must and will be responsive to public and private priority shifts. Low density development will probably give way to higher densities, as energy, service, and housing costs rise. If the development policies of the 1970's are strictly followed and never adjusted, our future in the 1980's may not be the future we will find acceptable.

10. Turning to another subject: air quality. On page 114, the report states: "The emission inventories presented in Table 7-1 indicate that recent reductions in the frequency and magnitude of pollution episodes do not result from reductions in pollutant emissions. Meterological conditions (inversion frequency and intensity, wind conditions, etc.) appear to be the controlling factors. Thus, 1977 represents an indicator of potential CO levels under unfavorable weather conditions." I challenge this conclusion for the following two reasons. First, you have presented absolutely no meterological data in the report or appendix which demonstrates that Boise has had progressively milder conditions every year since 1977. Secondly, we have been anticipating some beneficial results of improved auto emission control technology as newer vehicles replace older ones. Connected with this anticipation, we have observed a decline or stall in the rate of traffic volume increases on major streets in Boise since gasoline costs have risen.

If we were to assume that meteorological conditions were identical in 1980 and 1977, would it not be rational to conclude that reduced traffic levels would result in lower emissions and improved air quality?

11. I am puzzled at your interest in separating the emissions burden by neighborhoods and communities. (Table 7-1 and Table 7-2.) It is "Northern Ada County," with its complex of economic, commercial, social, and cultural interactions which result in our overburdening our air with more wastes than we can safely dispose of. Solutions to the problem must be region wide, not focused on any particular neighborhoods. That is why "Northern Ada County" is the non-attainment area, not just our denser neighborhoods.

Thank you for this opportunity to comment on the Draft EIS "Wastewater Management for Boise, Eagle and Ada County, Idaho." It is my view that it will always be better to treat wastes in such a way that neither ground nor surface water will be contaminated. I hope that the Environmental Protection Agency will see it that way also.

Sincerely,

Susan M. Stacy

Susan M. Stacy, AICP
DIRECTOR OF PLANNING

SMS:vvv

Response to Comments From Boise City Planning Department

1, 4, 5. Refer to revised text (Chapter 5).

2. Refer to revised text (Chapter 5). City and county wetline sewer policies directly link new development to the availability of wastewater treatment facilities.

3, 7. Comment noted.

6. The issue is not whether or not to have sewers, but rather how to efficiently plan for them in conjunction with other public services.

8, 9. Refer to revised text (Chapter 6).

10. Refer to revised text (Chapter 9). A comparison of the relative change in peak 1-hour and peak 8-hour CO levels (Appendix G of Draft EIS) clearly indicates that meteorological conditions have not remained constant from one year to the next. The various special studies summarized in the text also provide data on changing meteorological conditions. Air quality data from the downtown station during 1980 were further influenced by rerouting of traffic flows due to major construction work. The intent of the discussion on this topic was to identify the year which best illustrated the highest ambient air quality increment likely to result from a given increment of emissions. All data point to 1977 being that year.

11. Refer to revised text (Chapter 11).

PUBLIC WORKS DEPARTMENT
CITY HALL - 4TH FLOOR
(208) 384-4292

CITY OF TREES

BOISE CITY, IDAHO

RICHARD R. EARDLEY
MAYOR

COUNCIL MEMBERS
JOY BUERSMEYER, COUNCIL PRESIDENT
RALPH McADAMS, COUNCIL PRO-TEM
MARGE EWING
GLENN SELANDER
MIKE SILVA
KEITH [illegible]

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MAY 11 1981
ENVIRONMENTAL EVALUATION
BRANCH

May 8, 1981

Ms. Norma Young
U.S. Environmental Protection Agency
Region X
M/S 443
1200 6th Avenue
Seattle, WA 98101

Subject: Draft EIS for Wastewater Management for Boise, Eagle and Ada County, Idaho

Dear Ms. Young:

We have prepared the following comments with respect to the draft Environmental Impact Statement. These comments are general in nature and reflect our overall philosophy.

1. As stated when we presented oral testimony at the public hearing, we cannot stress enough the importance to the City of Boise that this EIS be completed prior to September 15, 1981, as indicated in your proposed schedule. Any delays could not only cost the City in inflation costs that we have incurred because of past delays, but also losing potential funding under recommended new state policy if the project was not ready for a grant offer before September 30. The City must have its grant offer by that date for Step II work.

2. We would request that any item in our Facility Plan that is indicated not to be controversial be pulled out and the City would be able to proceed with Step II work for those elements that appear to have no significant impact. Your agency by letter of March 10, 1981, from Don Dubois has indicated support for that procedure.

3. On page ii, the statement is made that to meet water quality standards at Lander Street, the plant will require construction of ammonia removal facilities, and minimum stream flows in the Boise River will be needed during the winter months or both. Our Facility Plan indicated that ammonia removal facilities would not be required if minimum instream flows in the Boise River were provided.

POST OFFICE BOX 500 - BOISE, IDAHO 83701
AN EQUAL OPPORTUNITY EMPLOYER

4. On Page xv, on Table 1 under Costs of Direct Area of Impacts, the comment is made, "Trunk transport of liquid or dewatered sludge is four to six times as expensive as pipe line transport." We concur with the recommendation to construct the pipeline. However, our Facility Plan indicated that the truck transport and sludge pipe line were near the same cost. The costs being discussed should be better defined. Also, the EIS has indicated that the Boise user charge was an average increase of $7.70 per month to approximately $8.60 per month for Stage 1 improvements and to $9.20 per month for Stage 2 improvements. It must be noted that is only for Boise City customers and not for our independent sewer agencies.

5. On Page 168, third paragraph, it indicates that West Boise is being designed to meet all water quality standards and the low flows from Lucky Peak are not an issue. Therefore, we do not understand why we cannot proceed with the design of the West Boise Treatment Facility, if in fact that we do not create a problem for water quality in the Boise River as stated in the EIS.

6. On Page 169, under Mitigation Measures, the EIS consultant recommends that the facility planners and the EPA not proceed with too detailed planning for Lander Street and West Boise until the flow issue is resolved, but on the previous page indicated that it is not an issue for the West Boise plant. We find this issue of flow augmentation to be very inconsistent throughout the document. We are building facilities which would be compatible with any river flow regime. Therefore, we feel we should proceed with construction to alleviate or minimize any potential water quality problem.

7. On Page 170, the Summary of Impacts, the last paragraph, indicates the Boise River flows for the Lander Street plant cannot be assured. The detailed planning of these facilities should not commence until availability of flows is assured. Our current plan is to provide for dechlorination and postaeration which will improve the water quality of the Boise River rather than damage that quality, therefore, we should proceed with those design and construction elements for Lander Street. If additional facilities are required to operate the plant to meet certain stream flow, then that problem needs to be addressed at a later date. The dechlorination and

postaeration facilities are required whether there is sufficient flows in the Boise River or not.

8. On Page 180, under Sediment, in reviewing the first paragraph under Sediment, it indicates that the gravels are not appropriate for trout spawning and that flows greater than a 1000 cfs are necessary to provide suitable water depths and velocity over the side channels where those gravels are available. This appears to say salmonid spawning is not physically achievable in the Boise River. Why is the Boise River protected for that designated use?

In summary, the City of Boise feels the most important issue to be made is the EIS recommendation to resolve the flow in the Boise River prior to proceeding with design and construction of the facilities at Lander Street and West Boise. The issue is that we are planning to provide facilities which are compatable with any future expansion that may be required due to low flow in the Boise River. The EIS reiterates several times how removal of chlorine from our Lander Street discharge will be advantageous to the fish habitat, but then state that we should not proceed with that developmental plan. Again we cannot stress importance to Boise enough of how critical completing the EIS process as soon as possible. If you have any questions, please contact us.

Sincerely yours,

Carl B. Ellsworth

Carl B. Ellsworth, P.E.
Environmental Engineer

CBE:re

Response to Comments From Boise Public Works Department

1. Comment noted.

2. Accelerated Step 2 grant items are discussed in the revised EXECUTIVE SUMMARY and the revised Chapter 1.

3, 4. See revised text (Chapter 3).

5, 6, 7. This discussion has been deleted from the revised text.

8. Some spawning undoubtedly occurs at lower flows. Flows often exceed 1,000 cfs near Boise during the rainbow trout spawning season (April-June).

EAGLE SEWER DISTRICT P.O. Box 368 • Eagle, ID 83616 • Ph. 208/939-0132

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April 13, 1981

U.S.Enviornmental Protection Agency
Region X
1200 Sixth Avenue
Seattle, Washington 98101

Attention: Ms. Norma Young (M/S 443)

Re: Eagle Sewer District Comments on the Ada County EIS

Dear Ms. Young:

We appreciate the opportunity to review and comment on the Draft Enviornmental Impact Statement (DEIS) for Wastewater Management for Boise, Eagle, and Ada County, Idaho. Our comments are as follows:

1. Page ii, paragraph 2 - It is stated that large flows occur in the Boise River during the summer and low flows during the winter. While this may be true for various reaches of the Boise River it is not accurate for all reaches. Because of the irrigation diversions into canals from the Boise River, flows in some reaches are severly reduced during the summer months. As this section relates to Boise, it appears to be accurate. However, as this section relates to discharges from Eagle, Meridian and Star, it is not entirely accurate.

Pagexx, paragraph 2.

Page 203, paragraphs 4, 5, and 6.

Page 204, paragraphs 1 and 2.

Page 205, paragraph 5.

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Page 245, paragraph 12 and page 246, paragraph 1.

These particular sections pertain to the loss of riparian wildlife habitat and to what has been referred to as "wetlands", as a result of constructing the Eagle Sewer District treatment facility.

We are in total disagreement with the classification
2. of the proposed treatment plant site as a wetland (pages xx,
204, and 205). We reference you to the letter of February 25,
1981 by Mr. Dennis G. Buechler of the U.S. Fish and Wildlife
Service where the determination was that "we do not consider
this small stream-blocked area to be a natural wetland." We
assume that this determination would satisfy the requirements
of Executive Order 1190.

While we agree that there will be some reduction of
riparian wildlife habitat, the DEIS does not quantify the extent
of the impacts of the reduction. The DEIS appears to rely on
subjective evaluations to justify a particular point of view.
3. The DEIS also states that the impacts associated with construct-
ing the new treatment facility are not mitigable. It is our
opinion that the approximate 15 acres of the total 65 acre site
does not represent a "significant" amount of riparian wildlife
habitat along the Boise River. It is our opinion that if the
4. riparian areas between Boise and Middleton are closely examined
you will find contiguous riparian areas of a much greater size
than the proposed treatment plant site. The proposed treatment
plant site is not unique.

We disagree with the statement on page xx that the impacts of constructing the treatment plant at the proposed site are not mitigable. The impacts are not only mitigable, but with careful operation the riparian wildlife habitat can be enhanced. 5. This would include construction techniques to reduce the transient impacts and operation and maintenance techniques to encourage proliferation of wildlife habitat. The proposed treatment plant is not an intensive operation and maintenance facility. Lagoon systems can be allowed to operate in a condition similar to a marsh or pond and thereby provide habitat.

We do not feel that additional investigation into other potential treatment plant sites is productive. The proposed treatment plant site meets the requirements and the minor enviornmental impacts will be mitigated.

Page 15, paragraph 2 - The effluent from the lagoons flows by gravity to the sand filters. The discharge point is located at approximately Boise River Mile 42.5.

Pages 54, 55, 56 and 57. Tables 4-17, 4-18, 4-19 and
6. 4-20 have been revised.

Page 67 - The treatment facility construction will be phased for ten (10) years design period.

Page 158, paragraph 4 - The design capacity for the existing Eagle Sewer District Treatment is 0.3 MGD for winter and 0.5 MGD for summer.

If you have any questions concerning the above comments please contact Kirby D. Vickers at 467-5252.

Sincerely,

Wayne Crosby

WAYNE CROSBY, Chairman

KDV:WC:cw

Response to Comments From Eagle Sewer District

1. Comment reflected in Chapter 11 discussion.

2, 3. Note revised text (Chapter 12).

4. Riparian habitat is widely considered by wildlife biologists to possess a disproportionately high value per acre for wildlife relative to other habitat types. The juxtaposition of food, water, and cover, as well as the diverse plant community structure, supports unusually large and diverse wildlife populations. The loss of any such productive habitat should be considered significant, especially in light of previous riparian habitat losses to agriculture and urbanization. Several large areas of riparian habitat do exist downstream of Eagle toward Middleton. Few large riparian areas, however, remain upstream of Eagle, where riparian habitat is usually very narrow or nonexistent.

5. See revised text (Chapter 12). The lagoons at the new facility will provide some open water wildlife habitat. Such habitat, however, is already available on the adjacent river, and some will be lost as the old facility is taken out of service. It is unlikely that the new facility will enhance existing riparian habitat or encourage a proliferation of wildlife habitat.

6. Corrections made to revised text.

F

City of Eagle

P.O. BOX 477
EAGLE, IDAHO 83616
208-939-6813

Mayor: Jerry Deckard
Council: Floyd Decker
Carol Haley
Orval Krasen
LeRoy Pearman

April 30, 1981

Ms. Norma Young, M/S 443
US Environmental Protection Agency, Region 10
1200 Sixth Avenue
Seattle, Washington 98101

The following are the comments of the City of Eagle on the Draft Environmental Impact Statement, Wastewater Management for Boise, Eagle, and Ada County, Idaho, dated March 16, 1981.

Changes to the draft EIS which are deemed necessary by the City of Eagle are attached as Enclosure 1.

1. Eagle's arguments on demographics are contained in Enclosure 2.

In our opinion, it would be unconscionable for any agency to ignore true demographics and insist on adhering to those put forth by the APA staff. Reference Section 4, page C-23, EIS Appendices, the City of Eagle agrees with the conclusions of Gruen Gruen & Associates, that APA did not property forecast employment, did not take into consideration employment growth caused by Hewlett-Packard, and did not consider employment growth of the Middlebrook project. APA staff is well aware of the problems with their population projections, but has pled lack of funds for not correcting the 208 plan.

Since it is the prerogative of EPA to either accept of reject the poulation projections in the 208 plan, and since the 208 plan is obviously flawed concerning the Eagle Area, it is requested that EPA use the year 2000 population figure of 12,775 for the City of Eagle.

2. Also, your attention is directed to 67-6528, Idaho Code. It is expected by the City of Eagle that this law will be adhered to by not only agencies of the State of Idaho, but also of the Federal Government.

Sincerely,

Jerry Deckard
Mayor

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City of Eagle
April 30, 1981
Enclosure 1

CHANGES TO THE DRAFT EIS RECOMMENDED BY THE CITY OF EAGLE, IDAHO

1. All references in the EIS to the Eagle Water and Sewer District should be corrected to reflect their proper title, "Eagle Sewer District."

2. Reference page 218, paragraph 2, the remark by Blake, "The Middlebrook project, as proposed, would consume 540 acres of some of the country's most productive agricultural lands," is not substantiated by facts. According to the Soil Conservation Service Soil Survey, the 540 acres includes some Class III-W (wetlands) which can hardly be considered as "most productive agricultural lands;" therefore, it is requested that this be deleted from the EIS. Further, since the City of Eagle has not approved any development in this area, let alone the composition of the development, the statement "This development would include 250 acres for industrial park and 290 acres for residential uses" is conjectural and should be eliminated from the Draft EIS. It is the policy of Eagle that any development in Middlebrook be done in phases, with each phase being approved at the time it is proposed, so as to allow those future elected offials to render their decisions on the then current plans.

3. Reference page 225 on schools in Eagle, it is suggested that the Meridian School District be contacted for current data on the schools in Eagle. Also, Eagle's population projection (paragraph 5) is not 10,225 but 12,775. Another source which should have been used was Eagle's Future Acquisitions Map and Capital Improvement Program and/or the Meridian School District Future Acquisition Map.

4. Reference page 227, the statement that "Eagle presently has no public park is not now true, nor was it true in the past. It is recommended that this paragraph be deleted and the City of Eagle be contacted for correct data.

City of Eagle
April 30, 1981
Enclosure 2

EAGLE CITY'S COMMENTS ON DEMOGRAPHICS

Chapter 5, page 63, Draft EIS, outlines EPA's policy of using population projections appearing in approved 208 plans. The city of Eagle understands this policy; however, it is expected that EPA will also give due consideration to the accuracy of such population projections. Federal monies were used by APA to write the following three documents:

1. Demographic and Economic Base Study, Ada County, Idaho, prepared by Wilbur Smith and Associates for APA, December 1976.

1. 2. Eagle, Idaho, Comprehensive Plan, prepared by APA, January 1978.

3. Demographic and Employment Distribution to year 2000, Ada County, Idaho, prepared by APA, August 1978.

The Wilbur Smith report assigns a year 2000 population of 13,825 to Eagle; the Eagle Comprehensive Plan a population of 12,775; and the APA report a population of 10,225.

The Draft EIS has adopted the APA population figure of 10,225; however, if the Ada County Demograph report prepared by APA is carefully examined, the only conclusion that can be reached is that these figures were wrong at their inception and there use can only cause a disservice to the City of Eagle and to Ada County. The report states:

(1) "The projected population for Eagle was distributed based on the Eagle Comprehensive Plan." This report then assigns a population of 10,225. On page 53 of the Eagle Comprehensive Plan, the population for Eagle is shown as 12,775. This is a difference of 25% which the APA staff has subsequently chosen to ignore.

2. (2) "Due to the liminted inventory of data for deriving specific acreages of remaining developable land, a simplified method of distributing projected population was used." If one turns to page 35 of the Eagle Comprehensive Plan (which was published prior to the Ada County Demographic report) one can see that the data on acreages of remaining developable land was available to APA.

(3) "The percentage of residential growth planned for each traffic zone was estimated from Eagle's Community Design Map." Page 61 of the report shows that Traffic Zones 178, 179, 180, 183 and 184 were used in arriving at the 10,225 population figure. If the Eagle Community Design Map on page 77 of Eagle Comprehensive Plan was used, who made the arbitrary and capricious decision to delete traffic zones 173, 174, 187 and 188? The City of Eagle did not and does not agree with these deletions.

(4) The Appendix Table for Ada County Residential Characteristics and Employment, on page 1-91, assigns an estimated population of 3800 to Eagle for the year 1980. The 1875 population (page 1-83) is given as 2720. This is a growth factor of 40%. A special census conducted in Eagle in 1977 showed a population figure of 1576. Without any further annexations, or changes in area size, the 1980 census showed a population of 2620, a gain of 66%. Again, as in (1) above, you can see a difference of 26% between APA staff estaimates and the actual population figures.

Response to Comments From City of Eagle

Cover Letter.

1. The Draft EIS did not adopt the population projection of 10,225 for Eagle in the year 2000 but rather stated that this number was the adopted 208 population projection. Other population figures were also mentioned as under consideration by the Eagle facility plan consultant (J-U-B Engineers) for wastewater facility planning purposes. The revised facility plan uses a population projection of 13,286 for the year 2000 in the Eagle facility planning area. Ada Planning Association, the regional agency responsible for 208 planning, has concurred with this allocation (13,286) and has adopted this allocation as the official 208 and 201 population projection for Eagle.

2. Idaho code number 67-6528 is the 1975 Idaho Local Planning Act. EPA policies require that wastewater facility plans be in conformance with local land use plans. As discussed, a general consistency now exists between the adopted population projection for 201 planning purposes and the wastewater facility plan. Other plan consistency issues are discussed in Chapter 6 - LAND USE IMPACTS.

Enclosure 1.

1. Text revisions made.

2. Because the area for the proposed Middlebrook development (planning area A in the Eagle facility plan) is not shown as a service area in the Eagle facility plan, an analysis of the agricultural resources in this area has not been prepared in the Final EIS. As a point of interest, however, planning area A consists of scattered areas of prime farmland but is predominately nonprime farmland.

3. The revised text (Chapter 8) reflects information provided by the Meridian School District. Population issues are discussed in response to cover letter comment 1.

4. Refer to revised text (Chapter 8).

Enclosure 2.

1, 2. Refer to response to cover letter comment 1.

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Mayor

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BRUCE D. STUART, Water Works Supt.
JOHN O. FITZGERALD, Attorney
ROGER WELKER, Fire Chief
EARL WARD, Waste Water Supt.

COUNCILMEN
RICHARD C. WILLIAMS
GRANT P. KINGSFORD
BILL BREWER
RICHARD F. ORTON, JR.

DONALD L. SHARP
Chairman Zoning & Planning

April 17, 1981

U. S. Environmental Protection Agency
Region 10
1200 6th Avenue
Seattle, Washington 98101

Dear Sir:

We have read your Draft of Environmental Impact Statement EPA-10-ID-Boise/Eagle-Ada-WWTW-81.

1. In this Draft you refer to Middlebrook Subdivision, Page 226 Fire Protection. You state that Eagle Fire District would give fire protection. This land is not in Eagle's District, but is in the Meridian Rural Fire District and would put undue hardship on our Department.

If you have any questions please feel free to contact us. Phone (208) 888-1234.

Sincerely,

Roger L. Welker

Roger L. Welker
FIRE CHIEF
MERIDIAN RURAL FIRE DISTRICT

RW/RV/ln

cc: Mayor and City Council
File (2)

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Response to Comments From City of Meridian

1. Comment noted. The Middlebrook area is no longer included in the service area for the Eagle Sewer District project.

To Ms. Norma Young
USEPA Region X

Date 5/11/81

Speed Message

From Tom Turco

Subject DEIS Boise

Please find Attached The Central Districts Comments on the DEIS.

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Wilson Jones Company

Signed

(Central District Health Department Comments)

DRAFT ENVIRONMENTAL IMPACT STATEMENT
WASTEWATER MANAGEMENT FOR BOISE, EAGLE, AND ADA COUNTY, IDAHO
EPA

	Page	Paragraph	
1.	V	4	"Most of Boise area residents using septic tanks would continue to do so with potential surface and groundwater contamination" This statement misleads the reader in that it implies ALL types of contamination to surface and groundwater. The main concern is increase in nitrates in the groundwaters and this fact needs to be clarified to the reader. Our tests have not revealed any concern for bacterial contamination.
2.	19	1	Again, it needs to be stressed that the concern was about nutrient (nitrate) contamination.
3.	145	1	"Nitrogen emissions in the Boise valley are most likely increasing as a result of Septic Tank Wastewater disposal practices" This statement is a broad sweeping generalization and there are no solid data to make such a statement. Review of tables 8.2 and 8.3 discredits this statement.
4.	145	1	IDWR now indicates they will not have funds to continue sampling.
5.	223	2	There is no mention of South County Water Company which supplies domestic water to numerous subdivisions in the area.

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Response to Comments From Central District Health Department

1. Comment noted. Even though bacterial contamination has not been identified there is nonetheless a potential for such problems.

2. Note revised text (Chapter 2).

3. This material reflects the opinion of the contractor performing this aspect of the study. Tables 10-2 and 10-3 (formerly 8-2 and 8-3) do not provide any time series data; thus, they do not directly support or discredit the conclusions being questioned.

4. Comment noted.

5. The South County Water Company was mentioned in the referenced paragraph.

SOIL
CONSERVATION
SOCIETY
OF AMERICA

R.N. Irving Chapter
Rm. 345, 304 No. 8th St.
Boise, Idaho 83702

May 7, 1981

Regional Administrator
U.S. Environmental Protection Agency
1200 6th Avenue
Seattle, Washington 98101

Dear Sir:

We have reviewed the draft Environmental Impact Statement for Wastewater Management for Boise, Eagle and Ada County, Idaho, and offer the following comments.

1. The Statement is based on the assumption that zoning is not an effective agricultural land preservation tool and that the transition of agriculturally zoned lands from rural to urban use to accommodate projected growth in the Boise planning area will likely occur. It addresses the high costs of sewage treatment plants, problems of air pollution, transportation, and mentions that prime agricultural land is a non-renewable resource and its conversion to urban uses is irreversible. The Statement does not consider or address the alternative of promoting urban expansion to the dry rangelands southeast of Boise.

2. The area southeast of Boise parallel to or adjacent to Highway 80N is for the most part presently classified as VIc with an irrigated potential of IIs. Domestic water is readily available from deep wells. Soils are suitable for home or condominium construction. Drainage or floodplain problems common to Boise Valley do not exist. Air inversion or air pollution problems common to Boise Valley are nonexistent. Sewage or wastewater treatment plants would be more economical because lagoon systems could be used and high water table problems common to irrigated Boise Valley are not present.

3. The alternative of developing urban expansion to the southeast could result in preservation of low energy cost prime agricultural lands and avoid further increased pollution problems on the Boise River. Future housing development on the Boise Valley floodplain could be avoided.

4. The area southeast of Boise is close to the downtown business district. Transportation energy costs to and from work could be kept at a reduced level.

5. The Statement does not address problems and concerns of irrigation districts, drainage districts, and canal companies. These districts and companies are presently being adversely affected by urban expansion into prime agricultural lands.

Yours truly,

Sharon Norris

Sharon Norris
Chapter President

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To advance the science and art of good land use

Response to Comments From Soil Conservation Society of America

1. The revised text discusses the impact of urban expansion into the Southeast area. Although the area is predominately designated prime farmland (refer to Figure 7-1), the impact of urbanization on current agricultural production is not considered significant.

2, 3. Policies which encourage development to locate in the Southeast area have been adopted in the Boise policy plan. Although the Southeast area has been designated as a priority development area in the policy plan, development of the Southeast area would result in some environmental problems. These problems have been addressed in sections of the Draft EIS pertaining to the specific subject areas.

4. Comment noted. The Southeast area has been designated as a priority development area in the Boise policy plan for a number of reasons; minimizing transportation energy costs is recognized as one reason for promoting development in that area.

5. We recognize that irrigation districts, drainage districts and canal companies are concerned with urban expansion into agricultural lands. As shown in Chapter 7, (Figure 7-1) much of the facilities planning area is designated prime farmland. It appears that the extent of future urban expansion will be determined by local land use planning procedures which establish Urban Service Planning Area (USPA) boundaries.

ADA PLANNING ASSOCIATION
650 Main Street
Boise, Idaho 83702
(208) 344-7600

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MAY 11 1981
IDAHO OPERATIONS OFFICE

May 8, 1981

Ms. Norma Young
Region X
Environmental Protection Agency
1200 Sixth Avenue
Seattle, WA 98101

REFERENCE: Comments on Draft EIS for Wastewater Management for Boise, Eagle and Ada County, Idaho

Dear Ms. Young:

As we indicated at your April 30, 1981, public hearing on the above-referenced EIS, the Ada Planning Association is submitting the attached comments for EPA's consideration in finalizing the report. Throughout the past several months, APA staff has worked very closely with both the Environmental Protection Agency and Jones & Stokes Associates, in an effort to provide up-to-date information for the EIS. As an areawide planning agency, we are attempting to provide a review perspective, which considers all aspects and possible impacts of the proposed projects under analysis.

Our various verbal and written comments and the guidance provided in earlier memorandums have covered the issues of concern. Please accept the attached written comments for further guidance in completing and expediting the final Environmental Impact Statement, in order that the affected projects may be initiated without any further delay.

Sincerely,

ADA PLANNING ASSOCIATION

Robert Hilgenberg

Robert Hilgenberg
Executive Director

Attachments

RM:RH:st/File 309

cc: Charlie Hazel - Jones & Stokes
M. Masarik - EPA
Richard Eardley, Mayor - City of Boise
Bill Ancell - Boise City Public Works
Jerry Deckard, Mayor - City of Eagle
Wayne Crosby, Chairman - Eagle Water & Sewer District

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Revised 05-08-81

ADA PLANNING ASSOCIATION COMMENTS ON FEBRUARY 1981 DRAFT EIS FOR WASTEWATER MANAGEMENT FOR BOISE, EAGLE & ADA COUNTY, IDAHO, PREPARED BY EPA

EXECUTIVE SUMMARY

Page ii, third paragraph:

1. Paragraph mentions a requirement for construction of ammonia removal facilities at the Boise Lander Street facility. This is not covered in the Boise Facility Plan Summary information listed on page 32 of the draft EIS.

Page iv:

2. Figure needs correction on Lake Caldwell to Lake Lowell.

Page xv, Table 1, Growth:

3. The 1980 population, according the 1980 Census, for Eagle is 2,620.

Page xx, 2nd Paragraph:

4. The statement should reflect the loss of habitat, rather than wetlands and it is felt that some of the facilities' expansion needs and their impacts are mitigable. These should be defined further resolved in the Eagle Step 2 grant.

Page xx, 2nd to last paragraph, 2nd sentence:

5. This is not a complete sentence and needs further correction.

Chapter 3 - WATER QUALITY MANAGEMENT IN ADA COUNTY

Page 10, Figure 3:

6. Change Lake Caldwell to Lake Lowell.

CHAPTER 4, WASTEWATER TREATMENT ALTERNATIVES

Page 24, Figure 4-2:

7. The legend for the service area, under the Lander Street Treatment Facility has been omitted and needs correction on the figure.

Page 30:

8. As with the comment on the Executive Summary section, the treatment plant expansion and modification, under Boise, does not indicate any ammonia problem and should be corrected to indicate that the river flow releases are being assumed to reduce the need for ammonia treatment.

General Comment - Chapter 4: EAGLE SEWER & WATER DISTRICT PLAN:

9. The draft EIS reflects, primarily, the information that was presented in the May, 1980 Facility Plan, prepared by JUB Engineers for the Eagle Sewer & Water District. Since that time, a December 1980 draft and an errata sheet on the December draft, have been issued by the District. The entire draft EIS should be updated to reflect the adjusted population, 20-Year Service Area, cost estimates, impact assessment, etc., of the more recent draft and errata sheet. This should include, among other things, the modification of Table 4-16, on page 51, which reflects different population projections that have since been adjusted. The Facility Plan and EIS effort should analyze only the impacts of 13,286 population projection for the Year 2000 for Area B, thereby, dropping off the costs and impact analysis for the lower population and facility flow projections on the tables reflecting the other projections.

CHAPTER 5, ANALYSIS OF FACILITY PLANNING POPULATION PROJECTIONS

Page 64, Southwest Community Planning Area Population Projections:

10. Wherever the word "projections" is used in this paragraph and others which refer to the 1978 Demographic and Employment Distribution Report prepared by APA, it should be replaced with "allocations" or "distributions." The populations "projections" for Ada County were prepared by the Idaho Department of Water Resources in an IPEF model. APA does not make projections, but merely allocates growth projections from the Department of Water Resources into subareas, based on comprehensive plans.

The allocation (18,985) currently used under the land use Plan C is correct. The population for the Southwest area of 22,380 was the original allocation in the APA DED Report. However, the 3,095 difference between those two allocations has not been totally directed to the Eagle Sewer Facility Plan area. The adjustment (for planning purposes) is not 13,600 for the Eagle Water and Sewer District, but 13,286 as expressed on page 66.

Page 66, Table 4-4

11. The 44,548 additional persons number referred to as being provided central sewer by 1987, on Table 4-4 cannot be found on that table.

If there is another source for this data, that source needs to be delineated.

CHAPTER 6 - LAND USE CONDITIONS AND TRENDS

Page 69, 2nd Paragraph

12. Add a final sentence that states, "The DED overall Ada County projection was taken from the 1976 BSU/DWR State of Idaho (IPEF 73) projection.

Page 69, 3rd Paragraph, last sentence

13. An Area of City Impact Agreement between Eagle and Ada County was adopted on September 23, 1980. The boundary is consistent with Figure 6-1 on Page 71, except on the eastern side where it follows Horsehoe Bend Road (Highway 55) and its alignment south to the north channel of the Boise River, then west along the river to the alignment of Cloverdale Road. This agreement has the effect of amending the Ada County Comprehensive Plan, which is the source of information used in Figure 6-1.

Page 71, Figure 6-1

14. There is no such agency as the "Ada County Planning Department." The source cited should be the "Ada County Comprehensive Plan 1977 as amended."

Page 75, 4th Paragraph, last sentence

The statement is inaccurate and should be reworded as follows:

15. This policy plan shows the Southwest area as part of the Boise Area of City Impact and it suggests a population goal for the area. However, a separate Southwest Community Comprehensive Plan has been adopted by Ada County. Garden City, which is part of the metropolitan area, is excluded from the Boise Policy Plan because it has its own comprehensive plan.

Page 85, Last Paragraph

16. This paragraph, dealing with the Eagle Sewer Service area south of the Boise River, should be deleted as it is not reflected in any adopted plan.

Page 86, 2nd Paragraph, 3rd sentence

17. The statement seems to be questioning "the county's ability to implement" the SW Plan. "Ability" was a poor choice of words and the following wording should be used as a substitute: "....depends on the county implementing the provisions..."

CHAPTER 7 - AIR QUALITY

Existing Air Quality Problems

Page 91 (last paragraph, last sentence)

18 It should be initially stated that Ada County is a non-attainment area for carbon monoxide. Pollutants which do not currently exceed federal health standards should be identified.

Page 92 (First paragraph, second sentence)

19 "The standards for 1-hour exposures is currently 35 ppm (parts per million), to be exceeded no more than once per year..." (recommend deleting remainder of sentence).

Permanent Monitoring Station Data

Page 98 (first paragraph, last sentence)

20 Question the portion of morning traffic in the warm mode. Suggest deleting the word "significant" from this sentence. "By the time it arrives at its destination," should be added at the end of the sentence.

Page 98 (third paragraph, last sentence)

21 Morning CO levels may well be a reflection of commute trips. Incorporate thought into explanation.

Data (Figures)

Pages 101 and 102

22 Include a footnote at some point, explaining difference between occurrence, exceedence and violation. This will reduce the likelihood of data misuse.

Institutional Framework

Page 103 (third paragraph, last sentence)

23 A brief description of the areas special "designation" for particulates would be appropriate here.

Page 104 (second point)

24. Include condition to implement a vehicle inspection and maintenance program.

Emissions Inventories

Pages 106, 108, 109

25. Recommend clarifying definition of ESDI in the text.

Future Air Pollution Potential in Ada County

Page 114 (third paragraph, fifth sentence)

26. Correct sentence by inserting "totally" between "episodes do not result" and "from reductions."

Page 114 (third paragraph)

27. It is a valuable planning tool to look at the pollution levels in the various community planning areas. However, this paragraph should stress that the source of pollution (automobiles) is an areawide problem. Simply because a particular planning area does not experience high levels within its boundaries, does not mean that its residents do not contribute to the high air pollution levels in another planning area.

Page 127 (list of measures)

28. Include: Cold-start considerations to be incorporated into an area vehicle inspection and maintenance program.

General Comment

29. Although Ada County's air quality problem is carefully described, the impact of the various potential facility expansions upon the area's air quality is not specifically addressed. The air quality impacts of the proposed facilities stem from the secondary impact of the growth accommodated by them, rather than any emissions from the actual facility. At a minimum, the following type of statement should be included at the end of this section:

"The Boise sewer facilities merely accommodate one service need of the growth projected and assumed in the area plans."

A brief expression of the general air impacts of proposed population shift accommodated in the Eagle Sewer and Water District Facility Plan should be included in the final EIS as agreed on at the April 8, 1981 work session.

CHAPTER 10 - FISHERY RESOURCES

Page 187, Indirect Impacts on Fisheries

1st Paragraph

30. The 1980 population for Ada County is 173,036 according to advance Census Reports. We would recommend deleting the range used and inserting the more current figure.

CHAPTER 12 - AGRICULTURAL LANDS IN ADA COUNTY

Page 207 - General

31. Although this chapter is called Agricultural Land in Ada County, it confines its analysis to the three wastewater study areas and does not describe how Ada County has endeavored to preserve agricultural land in areas designated as Rural Areas in the Ada County Comprehensive Plan. In addition, it does not address the conflicts between urban and rural land uses which may exist in the study areas. Consequently, it gives the impression that nothing is being done to preserve agricultural lands and that in all instances agricultural uses in Urban Service Planning Areas are viable, even though an agricultural parcel may be surrounded by urban uses. It is felt that local comprehensive plans adequately address this subject.

CHAPTER 13 - PUBLIC SERVICES AND FACILITIES

32. This section does not adequately address the problems that are currently facing local governments and special districts within Ada County and its orientation is so superficial as to be unusable in terms of analyzing the total impacts of growth and its direct relationship with sewer service development. The Ada Planning Association has exhaustively studied this subject under its Growth Management Facility Fees Analysis. Such studies point out the pubilc service and financial problems that face local government in Ada County.

Page A-15, 2nd Paragraph, 1st sentence

33. Change "parking" to "engine off."

Page A-16, 4th Paragraph, last sentence

Insert "selected" between "other" and "portions."

APPENDIX B - FISCAL OVERVIEW

34. On the whole, the Fiscal Overview Analysis was very well done and accurately pointed out the many problems that local governments currently face as a result of inflationary pressures, growth demands and revenue limitations. As accurate as this analysis is, there should be additional information within the EIS, which addresses itself to recent legislation that was passed by the 1981 Idaho Legislature.

APPENDIX C - ISSUE PAPER POPULATION PROJECTIONS FOR ADA COUNTY EIS ANALYSIS

35. As discussed at the April 8, 1981 meeting, it would be advantageous to delete this discussion from the appendix since these population issues have been resolved.

APPENDIX G

Page G-15, Chart

36. We request that the remainder of the 1980 CO data be included for the final report.

Response to Comments From Ada Planning Association

1-10. Corrections made to revised EIS sections.

11. See revised text (Chapter 5). This number was extrapolated from data presented in Table 4-4.

12. This paragraph has been deleted from the revised text.

13-16. Corrections made in revised text.

17. This paragraph has been deleted from the revised text.

18. Note revised text (Chapter 9, Page 136).

19. The last phrase in this sentence reflects EPA guidelines for interpreting federal air quality standards.

20. Note revised text and (new) Table 9-5.

21, 22. Note revised text (Chapter 9).

23. The Federal Register designation of attainment status does not discuss the basis for individual subarea designations. The Boise area has recorded ambient particulate values exceeding the federal primary standard. The attainment status designation was granted under EPA's "rural fugitive dust policy" due to the lack of industrial particulate sources in the area.

24-29. Note revised text (Chapter 9).

30. This paragraph has been deleted from the Final EIS.

31. The focus of this chapter has been changed somewhat to evaluate the impact of urbanization on agricultural resources within the planning areas. Although it is recognized that local land use plans and policies help preserve agricultural resources in the rural areas, the concern of this chapter is to examine the agricultural resources (i.e., designated prime farmland and farmland currently under production) which are expected to be converted to urban uses as a result of future growth in the facility planning areas. No attempt has been made to determine the economic value of specific parcels for either urban or agricultural use.

32. Note revised text (Chapter 8).

33,35,36. The appendix document has not been republished with The Final EIS; thus, no changes have been made to the appendices.

34. Much of this material has been incorporated (with some updating) into the revised EIS text (Chapter 8).

John V. Evans, *Governor*
Daniel T. Emborg, *Administrator*

State Capitol Building
Boise, Idaho 83720

DIVISION OF ECONOMIC AND COMMUNITY AFFAIRS

May 4, 1981

Ms. Norma Young
Environmental Protection Agency
Region X
Seattle, WA 98101

Dear Ms. Young:

The Idaho State Clearinghouse has completed its review on THE DRAFT ENVIRONMENTAL IMPACT STATEMENT - WASTEWATER MANAGEMENT FOR BOISE, EAGLE, AND ADA COUNTY, IDAHO - SAI #00315618. The following agencies were contacted for their review and comment:

Ada Planning Association
Ida-Ore Regional Planning and Development Association
Department of Water Resources
Department of Health and Welfare/Division of Environment
Department of Transportation/Division of Highways
Department of Fish and Game
Division of Economic and Community Affairs

The Department of Health and Welfare/Division of Environment made extensive comments - for complete details see comments attached. The Ada Planning Association state formal comments are being made directly to your agency - see comments attached. At the time of sign-off the other listed agencies have not commented. All late comments will be forwarded to your agency.

Thank you for letting us be of assistance in the review of your Draft Environmental Impact Statement. If you have any questions, do not hesitate to contact myself or Lois Wade at 208-334-4718.

Sincerely,

Gloria Mabbutt

Gloria Mabbutt, Coordinator
Idaho State Clearinghouse

GM/lw

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MAY 6 1981
ENVIRONMENTAL EVALUATION BRANCH

ADA PLANNING ASSOCIATION
650 Main Street
Boise, Idaho 83702
(208) 344-7600

AREAWIDE CLEARINGHOUSE
A-95 Project Sign-Off

PROJECT TITLE: DEIS Wastewater Mgmt. for Boise, Eagle & Ada County

STATE APPLICATION IDENTIFIER NUMBER: 00315618

CLEARINGHOUSE FINDING:

- ( ) Support Project
- ( ) Do Not Support Project
- ( ) Needs Attention
- ( ) No Comment

REVIEWING AGENCIES AND RESPONSES:	Support	Non-Support	No Comment	Comments Attached	No Response
Ada Planning Association				X	
Board of County Commissioners			X		
Mayor Eardley - Boise City			X		
Mayor Deckard - City of Eagle					X

COMMENTS: Formal comments are being made directly to the Environmental Protection Agency.

AREAWIDE CLEARINGHOUSE REPRESENTITIVE:

DATE: 4-20-81

EQUAL OPPORTUNITY/AFFIRMATIVE ACTION EMPLOYER

STATE OF IDAHO
**DEPARTMENT OF HEALTH
AND WELFARE**

DIVISION OF ENVIRONMENT
Statehouse
Boise, Idaho 83720

April 24, 1981

Ms. Norma Young
Environmental Evaluation Branch
U. S. EPA
Region X - M/S 443
1200 Sixth Avenue
Seattle, Washington 98101

Dear Ms. Young:

The Division of Environment, Idaho Department of Health and Welfare, has reviewed the draft EIS *Wastewater Management For Boise, Eagle, And Ada County, Idaho*, and wishes to submit the following comments:

1) Page A-46 of Appendix - BTU content of natural gas is 1000 BTU per cubic foot (not 10^6 cubic feet).

2) Page 148 - Our current water quality standards should be referenced rather than our 1973 standards.

3) Page 158 - Why is Caldwell listed as having a discharge to the Boise River when the other discharges in Canyon County are not listed?

4) Page 6 - The workshops were held in 1980 rather than 1979.

5) Page 43 - Proposed Eagle Sewer District plant site is not subject to wetlands policy.

6) Page 50 - EWSD population projections now have the concurrence of APA.

7) Page 52 - Rapid infiltration site has now been defined.

8) Page 66 and 218 - The 16,000 population figure is not included in the EWSD facility plan anymore.

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APR 29 1981
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9) Page 85 - The Section on the Eagle planning area needs to be redone to reflect new data on populations and planning areas and costs on Pages 54 - 57.

10) Page 168 - What is the basis for the statement "Lander Street plant does not have enough land available to install nitrification processes that are economical"?

11) Page 169 and 170 - The proposed design and construction at Lander Street and West Boise would be necessary for a river discharge regardless of minimum in stream flows. Therefore, the design of the Lander Street STP and West Boise STP need not be delayed until U. S. Water and Power Resource Services completes its operation studies of flow releases in the Boise River.

12) Page 204 - Executive Order 1190, Protection of Wetlands, does not apply to the Eagle site according to U. S. Fish and Wildlife Service.

13) Page 229 - The reference to near term scale of operation of City of Boise is unclear.

14) Page 235 - Reference is made to more complete analyses of several issues for the final EIA. Who will do these analyses and when will they do them?

15) The recommendation that detailed planning not proceed until stream flow issue is resolved should be deleted.

16) We did not note any discussion in the groundwater section on potential impacts of the EWSD proposed rapid infiltration alternative.

17) Which, if any, of the growth impact mitigation measures will be required? How are the measures implemented and enforced?

18) Page 244 - What is basis for statement that EWSD alternative B pipeline will "destroy" habitat for 19,000 l.f. and "significantly" impact a blue heron rookery. In contrast Page 245 notes that North Boise interceptor "may disturb" a blue heron rookery.

19) Page 246 - Will we still require consultation with Fish and Wildlife on EWSD treatment construction mitigation measures?

Thank you for the opportunity to comment on this Environmental Impact Statement.

Sincerely,

Lee W. Stokes, Ph.D.
Administrator

LWS/b

Response to Comments From Idaho Division of Environment

1. Correction noted. The appendices to the Draft EIS have not been republished with the Final EIS. The error noted is a typographical error only; all calculations were performed using the correct BTU value.

2. This material was excerpted from the Draft Facility Plan (CH2M Hill 1980c).

3. Note revised text (Chapter 11).

4. Text corrections made.

5. Note revised text (Chapter 12).

6. Note revised text (Chapters 4 and 5).

7. Note revised text (Chapter 3).

8, 9. Text corrections made.

10, 11. Material deleted from revised text.

12. Note revised text (Chapter 12).

13. The reference should have been to the City of Eagle.

14. Note revised Chapters 5, 8, and 9.

15. Material deleted from revised text.

16. Note revised text (Chapter 10).

17. These measures have not yet been identified by EPA as potential grant conditions. The Clean Air Act mandates actions such as those discussed in terms of air quality.

18. Note revised text (Chapter 14).

19. Note discussion of the Eagle site in Chapter 12, page 236.

STATE OF IDAHO

DEPARTMENT OF FISH AND GAME

REGION 3
109 WEST 44TH
GARDEN CITY, IDAHO 83704

May 12, 1981

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MAY 15 1981
ENVIRONMENTAL EVALUATION
BRANCH

Environmental Protection Agency
Region X
1200 Sixth Ave.
Seattle, WA 98101

Re: Environmental Draft Impact Statement Wastewater Management for Boise, Eagle and Ada County, Idaho

Dear Sirs:

Personnel from the Idaho Department of Fish and Game have reviewed the above referenced document and offer the comments listed below.

In general, the document adequately covers the alternatives and associated environmental problems. We are concerned with the loss of riparian vegetation associated with the construction of the Eagle facilities. The document adequately states the impacts to wildlife from loss of riparian cover. However, the document does not state the adverse impacts to the river and the fishery. Not only does riparian vegetation provide cover for wildlife, it also provides shading for the rivers, maintianing cool water temperatures necessary for cold water fisheries. Should the Eagle facility require construction at the site selected, we recommend a minimum 100-foot buffer between the river and the sewage treatment facility.

Specifically:

1. Page 171. Present Day Fishes - Although largemouth bass and bluegill may be more popular in the Boise River, rainbow trout and brown trout are more abundant and much more important in the study area.
2. Page 173. Table 10-1 - The Boise River between Lucky Peak dam and the river mouth contains no coho salmon or cutthroat trout.

3. The document does not state the adverse impact to the river or its fishes due to the potential loss of riparian vegetation due to construction of the Eagle facility.

4. Page 246. Fisheries - The Boise River does not support any anadromous fish.

5. Page 246. The Idaho Department of Fish and Game does not issue permits for river alteration -- Water Resources is the proper department.

Sincerely,

Ray Lyon

for James P. Keating
Regional Supervisor
Region 3/Boise

cc: Ada County Planning

Response to Comments From Idaho Department of Fish and Game

1. The EIS states that species composition in the river near Boise State University (and hence the City of Boise proper) is dominated by whitefish and trout. However, since the effects of the Boise discharges could potentially affect areas far downstream, the "study area" extended to the mouth of the Boise River.

2, 4, 5. Note revised text (Chapter 11).

3. Note revised text (Chapter 11) and mitigation measures in Chapter 12, page 236.

United States Department of the Interior

FISH AND WILDLIFE SERVICE

ECOLOGICAL SERVICES
4620 Overland Road, Room 209
Boise, Idaho 83705

RECEIVED
FEB 27 1981
IDAHO OPERATIONS OFFICE

February 25, 1981

R[illegible]
MAR 4 1981
ENVIRON[illegible]

Mr. Mark T. Masarik, Urban Area Coordinator
U.S. Environmental Protection Agency
Idaho Operations Office
422 West Washington Street
Boise, ID 83702

Dear Mark:

1. This responds to your recent request for our Service's opinion on a questionable wetland area located approximately three miles west of Eagle, Idaho. The area in question is the city-owned property (65 acres) that is designated for a sewage lagoon site for the city of Eagle. By this letter, we are advising your office and Mr. Kirby D. Yickers, P.E. of J-U-B Engineers, Inc., that we do not consider this small stream-blocked area to be a natural wetland.

We appreciate being advised of this proposal. As discussed during the January 30, 1981, field trip, we are available if additional imput is needed for the possible implementation of any waterfowl structures or wildlife plantings associated with the development of this site. Please feel free to contact our office at anytime. Thank you.

Sincerely yours,

Dennis G. Buechler

Dennis G. Buechler
Field Supervisor

cc: J-U-B Engineers
(212 Tenth Avenue South, Nampa, ID 83651
Attention: Mr. Kirby D. Vickers
IDF&G, Boise/Region III

Response to Comments From U. S. Fish and Wildlife Service

1. Note revised text (Chapter 12).

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
BOISE SERVICE OFFICE
419 NORTH CURTIS ROAD
BOISE, IDAHO 83704

March 23, 1981

REGION X

IN REPLY REFER TO:
10.4HTV - S/D

RECEIVED
MAR 25 1981
ENVIRONMENTAL EVALUATION BRANCH

Mr. Donald Dubois
U. S. Environmental Protection Agency
Region X
1200 Sixth Avenue
Seattle, Washington 98101

Dear Mr. Dubois:

Subject: FHA/HUD Response Environmental Impact Statement
Boise, Eagle, and Ada County, Idaho

1. We agree with the mitigation measures for drainage listed on page 222 of the subject report. It is the policy of this agency that street right-of-ways in subdivision development must be accepted for maintenance by local authority having jurisdiction. It is our position that acceptance of these right-of-ways also constitutes acceptance of street drainage within these right-of-ways, and we recognize the local authority's responsibilities for drainage.

It is the policy of this office not to accept holding or retention ponds onsite unless they are owned and maintained by the local authority or other acceptable public entity. Home Owner Associations that are a part of a Planned Unit Development offering alternative use of retention or holding ponds can be acceptable. Home Owner Assocations for drainage purposes only will not be accepted.

Sincerely,

Reno Kramer
Supervisor
Boise Service Office

Response to Comments From U. S. Department of Housing and Urban Development

1. Comment noted.

United States
Department of
Agriculture

Soil
Conservation
Service

Room 345
304 North 8th Street
Boise, Idaho 83702

April 23, 1981

Ms. Norma Young
U.S. Environmental Protection Agency
Region X, 1200 6th Ave.
Seattle, Washington 98101

Dear Ms. Young:

We have reviewed the Environmental Impact Statement draft for Waste Management for Boise, Eagle and Ada County, Idaho and have the following comments:

1) Chapter 12, last paragraph, page 207, indicates an absence of a prime farmland map for Ada County. At the time information requested from SCS, there was not a prime farmland map or a published soil survey. Prime soils had not been identified either. Information was provided that land capability class I and II would probably be classified as prime agricultural land.

   Prime soils have been identified but a map has not been published. Information is available from SCS for prime ag lands in Ada County.

2) The first sentence on page 208 states that "All lands designated as Class I and II in figure 12-1 are considered prime farmland," is not quite correct. The following should be added to the statement: "When irrigated". The (figure 12-1) information shows much of south Ada County desert as prime farmland, including the Army National Guard maneuvering area.

3) You may want to contact Leland Holstine, District Conservationist, Meridian Field Office, P.O. Box 421, Meridian, Idaho 83642 - telephone 888-1890 for up-to-date information on prime agriculture land in Ada County.

Thank you for the opportunity to review and comment on this draft EIS.

Sincerely,

Amos I. Garrison, Jr.
State Conservationist

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BRANCH

The Soil Conservation Service
is an agency of the
Department of Agriculture

SCS-AS-1
10-79

Response to Comments From U. S. Soil Conservation Service

1, 2, 3. Note revised text (Chapter 7), especially Figure 7-1.

DEPARTMENT OF THE ARMY
WALLA WALLA DISTRICT, CORPS OF ENGINEERS
BUILDING 602, CITY-COUNTY AIRPORT
WALLA WALLA, WASHINGTON 99362

REPLY TO
ATTENTION OF:
NPWEN-PL

12 May 1981

RECEIVED
MAY 18 1981

Ms. Norma Young
Region X
Environmental Protection Agency
M/S 443
1200 Sixth Avenue
Seattle, Washington 98101

Dear Ms. Young:

1. We have reviewed the Draft Environmental Impact Statement for Wastewater Management for Boise, Eagle, and Ada County, Idaho. Our review does not reveal any effects on navigation, flood control, or hydropower development. If you do any dredging or filling in rivers or wetlands, you will need a 404 permit under the Clean Water Act. A permit may be applied for by contacting this section prior to construction:

Regulatory Functions Section
Walla Walla District, Corps of Engineers
Bldg. 606, City-County Airport
Walla Walla, Washington 99362

We appreciate the opportunity to review this Draft Environmental Impact Statement.

Sincerely,

M G Brammer
M. G. BRAMMER
Chief, Engineering Division

Response to Comments From U. S. Army Corps of Engineers

1. Comments noted. Note U. S. Fish and Wildlife Service letter regarding Eagle facility site.

Advisory Council On Historic Preservation

1522 K Street, NW
Washington, DC 20005

Reply to:

Lake Plaza South, Suite 616
44 Union Boulevard
Lakewood, CO 80228

May 13, 1981

Mr. Donald P. Dubois
Regional Administrator
U.S. Environmental Protection Agency
Region X
1200 Sixth Avenue
Seattle, Washington 98101

Dear Mr. Dubois:

Thank you for your request of March 16, 1981, for comments on the
environmental statement for Wastewater Management for Boise, Eagle,
and Ada County, Idaho. Pursuant to Section 102(2)(c) of the National
Environmental Policy Act of 1969 and the Council's regulations,
"Protection of Historic and Cultural Properties" (36 CFR Part 800),
1. we have determined that your draft environmental statement appears
adequate concerning our area of interest, and we have no further
comments.

Sincerely,

Louis S. Wall
Chief, Western Division
of Project Review

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MAY 18 1981
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Response to Comments From Advisory Council on Historic Preservation

1. Comments noted.

LIST OF REPORT PREPARERS

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Area of EIS Responsibility. Oversees all EIS preparation efforts for EPA Region 10.

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Area of EIS Responsibility. Principal monitor and reviewer of Ada County/Boise EIS.

Mark Masarik - Urban Area Coordinator EPA Operations Office, Boise.

Area of EIS Responsibility. Coordinates efforts of EIS team with local government agencies and contractors.

Jones & Stokes Associates, Inc., Sacramento, California

Charles R. Hazel - B.S., M.S., and PhD., Fisheries Biology. Formerly with California Department of Fish and Game as Director of Water Pollution Control Laboratory. As Vice President of Jones & Stokes Associates, Inc., has managed numerous environmental studies and reports and served as expert consultant in fisheries and water quality ecology.

Area of EIS Responsibility. Program director.

Harold D. Bissell - B.A., Biochemistry, M.A., Zoology. Formerly with California Department of Fish and Game as wildlife biologist; leader of wildlife nutrition laboratory; and assistant chief of coastal resources. Also chairman of state power plant siting committee, and former executive secretary of California Interagency Council for Ocean Resources. As environmental scientist with Jones & Stokes Associates, Inc., contributor to, and manager of, numerous environmental studies and impact statements and reports.

Area of Responsibility. Project manager.

Robert D. Sculley - B.S., Zoology, M.S., Ecology. Staff ecologist with special expertise in air quality analysis including modeling, development of emission inventories and projection of air quality changes. With Jones & Stokes Associates, Inc., for 9 years with varying project management, and resource planning and environmental impact analysis experience.

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Area of EIS Responsibility. Editing and coordinating.

Michael Durkin - B.A., Geography.

Area of EIS Responsibility. Air quality.

Patricia S. French - B.A., French, M.L.S., Library and Information Studies

Area of EIS Responsibility. Preparation of reference listing.

Glenn Gephart - B.A., Biological Sciences and Ecology, M.S., Wildlife Science.

Area of EIS Responsibility. Vegetation and wildlife.

Albert Herson - AICP, B.A., Psychology, M.A., Psychology, M.A., Urban Planning

Area of EIS Responsibility. Land use studies, population issues and community services.

JoAnne Sorenson - B.A., Biology, M.A., Biology.

Area of EIS Responsibility. Editing.

Curtis E. Spencer - P.E.

Area of EIS Responsibility. Drainage and hydrology.

Thomas C. Wegge - B.A., Urban Studies, M.S., Environmental Economics.

Area of EIS Responsibility. Land use, growth implications and population projections.

Jones & Stokes Associates, Inc., Seattle, Washington

Jonathan H. Ives - B.B.A., Wildlife Management, M.S., Wildlife Biology.

Area of EIS Responsibility. Hydrology, wastewater alternatives, and water quality management.

Culp-Wesner-Culp Cameron Park, California

Robert Williams - B.S., Civil Engineer, M.S., Sanitary Engineer.

Area of EIS Responsibility. Evaluation of facility plans, description of existing facilities.

Justin Faisst - B.S., Civil Engineer, M.S., Environmental Engineer.

Area of EIS Responsibility. Evaluation of facility plans, description of existing facilities.

H. Esmaili and Associates, Inc., Berkeley, California

Houshang Esmaili - Doctor of Engineering, Water Resources Engineering.

Area of EIS Responsibility. Overall coordination, supervision of groundwater/water studies.

Nicholas Johnson - M.S., Hydrology.

Area of EIS Responsibility. Hydrology and groundwater quality.

Barry Hecht - PhD., Candidate in Geography.

Area of EIS Responsibility. Hydrogeology and groundwater quality.

Roger Abraham - M.S., Soil Science.

Area of EIS Responsibility. Nonpoint source loadings.

Gruen Gruen + Associates
San Francisco, California

Roberta Mundie - Master of City Planning.

Area of EIS Responsibility. Population and fiscal impacts analysis.

Suzanne Lampert - Master of Public Affairs and Urban Planning.

Area of EIS Responsibility. Population and fiscal impact analysis.

Geological Drafting Service,
Sacramento, California

Steve Fleming - Extensive Cartographic Experience.

Area of EIS Responsibility. Report graphics.

ACRONYMS AND ABBREVIATIONS

ACHD	Ada County Highway District
ACOG	Ada Council of Governments
APA	Ada Planning Association
BEA	Bureau of Economic Analysis
BOD	biochemical oxygen demand
BWQ	Bureau of Water Quality
$CaCO_3$	calcium carbonate
CDHD	Central District Health Department
CEQ	Council of Environmental Quality
cfs	cubic feet per second
CO	carbon monoxide
DED	Demographic and Employment Distribution
EIS	Environmental Impact Statement
EPA	U. S. Environmental Protection Agency
ESD	Eagle Sewer District
ESDI	Emission Source Density Index
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
IDFG	Idaho Department of Fish and Game
IDHW	Idaho Department of Health and Welfare
IPCo	Idaho Power Company
IWRB	Idaho Water Resources Board
lbs/ac	pounds per acre
MGD	million gallons per day
mg/l	milligrams per liter
mmhos/cm	millimhos per centimeter
N	nitrogen
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NH_3	ammonia
NOI	Notice of Intent
NO_3-N	nitrate measured as N
NPDES	National Pollutant Discharge Elimination System

OMB	Office of Management and Budget
ppm	parts per million
SHPO	State Historic Preservation Officer
SRMF	Stream Resource Maintenance Flow
SWIDD	Southwest Interim Development District Ordinance
TSS	total suspended solids
201	Section 201 of the Clean Water Act
208	Section 208 of the Clean Water Act
USGS	U. S. Geological Survey
USSCS	U. S. Soil Conservation Service
USPA	Urban Service Planning Area

EIS DISTRIBUTION LIST

Federal Agencies	Advisory Council on Historic Preparation
	U.S. Department of Agriculture Farmers Home Administration
	U.S. Department of Commerce National Marine Fisheries Service
	U.S. Department of Defense Corps of Engineers, Seattle District
	U.S. Department of Health and Human Services
	U.S. Department of Housing and Urban Development
	U.S. Department of the Interior Fish and Wildlife Service
	U.S. Bureau of Reclamation
	U.S. Department of Transportation Federal Highway Administration
Idaho State Agencies	Central Health District
	Division of Environment Air Quality Bureau
	Department of Fish and Game
	Department of Planning and Community Affairs
	Department of Transportation
	Department of Water Resources
	State Clearinghouse
Ada County	Board of County Commissioners
	Engineer
	Highway District
	Planning Association
	Zoning Department

City of Boise	City Council
	Planning & Zoning Department
	Public Works Department
Elected Officials	Honorable John Evans Governor of Idaho
	Honorable Richard Eardley Mayor, City of Boise
	Honorable Jerry Deckard Mayor, City of Eagle
	Honorable Joseph Glaysier Mayor, City of Meridian
Citizens Groups	Ada County Conservation League
	Ada County Medical Society
	Idaho Citizen's Coalition
	Idaho Historical Society
	Idaho Lung Association
	Idaho Water Users Association
	Idaho Wildlife Society
	League of Women Voters of Boise
	League of Women Voters of Idaho
	Soil Conservation Society of America
	Wilderness Society
Others	Bench Sewer District
	Boise Public Library
	Eagle Water & Sewer District
	The Idaho Statesman
	West Boise Sewer District

A local citizen mailing list is available upon request.

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